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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AMONGST PHARMACISTS.

This Association of Chemists and Druggists and others interested in Pharmacy is managed by about twenty unpaid officers annually elected by the members.

ANNUAL MEETINGS OF MEMBERS.

1863, NEWCASTLE. 1864, BATH. 1865, BIRMINGHAM. 1866, NOTTINGHAM. 1867, DUNDEE. 1868, NORWICH. 1869, EXETER. 1870, LIVERPOOL. 1871, EDINBURGH. 1872, BRIGHTON. 1873, BRADFORD. 1874, LONDON. 1875, BRISTOL. 1876, GLASGOW. 1877, PLYMOUTH. 1878, DUBLIN. 1879, SHEFFIELD. 1880, SWANSEA. 1881, YORK. 1882, SOUTHAMPTON. 1883, SOUTHPORT. 1884, HASTINGS. 1885, ABERDEEN. 1886, BIRMINGHAM. 1887, MANCHESTER. 1888, BATH. 1889, NEWCASTLE-ON-TYNE. 1890, LEEDS. 1891, CARDIFF.

The chief business of the meetings is the communication of written investigations made by members during the year, and includes discussions on such papers by the assembled members and visitors.

Presidents:—

1863-4, 1864-5, H. DEANE, F.L.S.; 1865-6, 1866-7, Prof. BENTLEY, M.R.C.S.; 1867-8, 1868-9, D. HANBURY, F.R.S.; 1869-70, 1870-1, W. W. STODDART, F.C.S.; 1871-2, 1872-3, H. B. BRADY, F.R.S.; 1873-4, 1874-5, T. B. GROVES, F.C.S. 1875-6, 1876-7, Prof. REDWOOD, F.C.S.; 1877-8, 1878-9, G. F. SCHACHT, F.C.S.; 1879-80, W. SOUTHALL, F.L.S.; 1880-1, R. REYNOLDS, F.C.S.; 1881-2, 1882-3, Prof. ATTFIELD, F.R.S.; 1883-4, J. WILLIAMS, F.C.S.; 1884-5, J. B. STEPHENSON; 1885-6, T. GREENISH, F.C.S. 1886-7, S. R. ATKINS, J.P.; 1887-8, F. B. BENDER, F.I.C., F.C.S. 1888-9, 1889-90, C. UMNEY, F.I.C., F.C.S. 1891, W. MARTINDALE, F.C.S.

THE YEAR-BOOK OF PHARMACY AND TRANSACTIONS.

The Conference annually presents to members a handsome octavo volume of about 600 pages, containing the proceedings at the yearly meeting, and a report on the progress of pharmacy, or Year-Book, comprising abstracts of papers on pharmacy, materia medica, and chemistry, and on new preparations, processes, and formulae, published at home and abroad during each year. The funds of the Conference, composed of annual subscriptions of seven shillings and sixpence, are devoted to the production of this useful book, no pains being spared to make it the desk companion of the year, and an invaluable permanent work of reference for every chemist and druggist. The Executive Committee of the Conference trusts that members will show the current Year-Book to their friends and acquaintances—principals, assistants, or pupils—and obtain as large a number of new members as possible. Alphabetical lists of the names and addresses of subscribers will be found in each Year-Book.

NOMINATION FOR MEMBERSHIP.

Gentlemen desiring to join the Conference can be nominated at any time on applying to a Secretary or any other Officer or member. The Name and Address of each candidate should be written legibly, and forwarded to "The Asst. Secretary," British Pharmaceutical Conference, 17, Bloomsbury Square, London, W.C., together with the subscription.

THE ANNUAL SUBSCRIPTION.

The Conference year commences on July 1st, and Annual Subscriptions are due in advance on that date. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing in any European country, Canada, or the United States of America. For those resident in other countries, if the Year-Book be mailed direct to members, it is as follows:—Australasian Colonies, 10s.; South Africa, India, China, and Japan, 9s. 6d.; West Indies and Mauritius, 8s. 10d. Remittances may be made by Postal or Post Office Order, crossed " & Co.," made payable to the *British Pharmaceutical Conference*, at the "High Holborn" Post. Office, or by Cheque, and should be addressed as follows:—"The Asst. Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C."

To all members who have previously paid the Annual Subscription, the Year-Book, including Transactions, is posted as soon as published in December, and to other members immediately on receipt of the Subscription. Extra copies of the Year-Book and Transactions for 1870 and subsequent issues, will be sent to members on receipt of Subscription as above, for each additional copy. To non-members, the price is Ten Shillings per volume, exclusive of postage.

Honorary General Secretaries, { W. A. H. NAYLOR, F.I.C., F.C.S., London.
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YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS,

FROM JULY 1, 1889, TO JUNE 30,

1890.

ONTARIO
COLLEGE OF PHARMACY
44 GERRARD ST. E.
TORONTO,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL
CONFERENCE

AT THE

TWENTY-SEVENTH ANNUAL MEETING

HELD AT

LEEDS,

SEPTEMBER, 1890.

LONDON:

J. & A. CHURCHILL, 11, NEW BURLINGTON STREET.

MDCCCXC.

YEAR-BOOK OF PHARMACY AND TRANSACTIONS

OF THE

British Pharmaceutical Conference.

1889-90.

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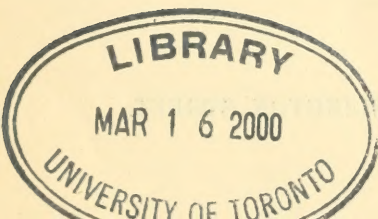
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BRITISH PHARMACEUTICAL CONFERENCE.

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1866	Nottingham	Prof. BENTLEY, F.L.S. . .	{ Dr. EDWARDS, F.C.S. SAMUEL PARR. } { D. HANBURY, F.R.S. W. W. STODDART, F.G.S. }	J. H. ATHERTON, F.C.S.
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THE BRITISH PHARMACEUTICAL CONFERENCE.

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THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meetings are usually held in the provinces, at the time and place of the visit of the British Association; that for 1891 will be held at Cardiff.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretary, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7*s.* 6*d.* for members residing in any European country, Canada, or the United States of America. For those resident in other countries, if the Year-Book be mailed direct to members, it is as follows:—Australasian Colonies, 10*s.*; South Africa, India, China, and Japan, 9*s.* 6*d.*; West Indies and Mauritius, 8*s.* 10*d.* Further information may be obtained from

THE ASST. SECRETARY; BRIT. PHARM. CONF.,
17, Bloomsbury Square, London, W.C.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 287.



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INTRODUCTION.

A SURVEY of the contents of this volume will satisfy the reader that the steady advance of pharmacy and the sciences related to it has been fully maintained during the past year. Though there is no record of sensational discoveries, or of anything specially claiming a place in the forefront of the multifarious subjects to be briefly reviewed in this introductory chapter, there is certainly no lack of matter forming valuable and important additions to pharmaceutical literature. Selecting as a starting-point for our present observations some of the recent work in connection with the vegetable alkaloids and allied principles, on account of the special interest attaching to these bodies, we refer in the first place to the latest contributions to the chemistry of the cinchona bases. From these it appears that not only the four naturally occurring bases—quinine, quinidine, cinchonine, and cinchonidine—but also the amorphous compounds—quinicine and cinchonicine—formed therefrom by intramolecular change, are so similar in constitution that the only difference in their decomposition-products is due to a difference in the empirical formulæ of the alkaloids. All the six bases named are shown by Z. H. Skraup and J. Würstl to contain one and the same group of atoms, from which, on oxidation, cincholeupone is formed. Hydroxyquinoline, another oxidation-product of cinchonine and cinchonidine, has now been obtained also from cinchonic acid by oxidation with chromic and sulphuric acids; and when thus prepared it proves to be identical in every respect with the corresponding product of the direct oxidation of cinchonine. It is from continued researches in this direction, and the fuller light thus shed upon the chemical constitution of these alkaloids, that their final synthesis may ere long be confidently expected.

Much attention has lately been devoted to the mydriatic alkaloids. E. Schmidt and C. Siebert state that the roots of *Scopolia* (*Scopola*) *atropoides* yield principally hyoscyamine and a very small proportion of hyoscyne. They have also obtained from them a small quantity of atropine, but admit that this may have

been a product of alteration. In a subsequent report by E. Schmidt, it is shown that the hyoscyne obtained from this source differs from Ladenburg's hyoscyne in composition and properties, and must be regarded as a new base. The differences observed between the two are stated to be still more marked in their hydrobromides and gold salts. From the latest account on this subject it appears that this new base is not limited to the root of *Scopolia atropoides*, but that it exists also in small quantities in *Atropa Belladonna*, *Duboisia myoporoides*, and *Datura Stramonium*. The hyoscyne salts met with in commerce seem to contain both Ladenburg's hyoscyne and the new base in variable proportions. In a communication from the Research Laboratory of the Pharmaceutical Society, to which reference will again be made further on, W. R. Dunstan and A. E. Chaston report that the rhizome of *Scopola carniolica* contains hyoscyamine and possibly traces of hyoscyne, together with a fluorescent principle, a crystalline sugar, and a cholesterin-like fat. Special care was taken by them to prevent the formation of atropine from the hyoscyamine during the process of extraction and isolation. With regard to the constituents of *Atropa Belladonna*, E. Schmidt has ascertained that full-grown roots contain principally hyoscyamine and no atropine, and appear to undergo no change in this respect if kept for years after collection. The stage of growth, however, seems to have some influence on the nature of the alkaloids, since roots of one year's growth were found to contain free atropine, together with hyoscyamine, while the roots of old plants contained hyoscyamine only. An examination of trade specimens of atropine sulphate by J. B. Nagelvoort leads to the conclusion that much of the salt now met with in commerce is really hyoscyamine sulphate, the action of which, however, is the same both on the healthy and the diseased eye. The mydriatic properties of mandragorine, the alkaloid of mandragora root, have been confirmed, and traces of a mydriatic alkaloid have been observed in *Solanum tuberosum*, *S. Nigrum*, and *Lycium barbarum*.

The supposed chemical identity between the crystalline and the amorphous product obtained simultaneously in the preparation of solanine from the young shoots of *Solanum tuberosum* is disproved by R. Firbas, who finds that they differ from each other in composition as well as in their properties, and proposes to distinguish the two by the names *solanine* and *solaneine* respectively.

The notices of opium bases in this volume are limited to codeine, morphine, and narceine. E. Claassen points out that codeine is capable of decomposing morphine salts, with precipitation of the

morphine, and that this reaction is sufficiently complete to admit of its application for the quantitative estimation of codeine present in a liquid. Z. H. Skraup and D. Wiegmann have repeated some of Knorr's recent experiments bearing on the constitution of morphine, and have obtained results confirmatory of their supposition that the nitrogen-atom in this alkaloid has both a methyl- and an ethyl-group directly attached to it. Replying to some adverse criticism by P. C. Plugge, E. Merck re-affirms his previous statement that chemically pure narceine possesses a weak alkaline reaction, and is capable of combining chemically with acetic acid. In answer to objections raised to some of his other observations respecting this alkaloid by D. B. Dott, the same chemist insists on the importance of the melting-point of narceine as a means of establishing its perfect purity, and repeats his assertion that narceine containing hydrochloric acid cannot be completely freed from that impurity by recrystallization.

Some very interesting additions have again been made to the literature of coca bases. The occurrence of a second crystallizable alkaloid, identified as cinnamylcocaine, as a natural constituent of coca leaves, has been observed almost simultaneously by B. H. Paul in conjunction with A. J. Cownley, and by F. Giesel. Comparisons of this product, both by F. Giesel and C. Liebermann, with cinnamylcocaine prepared synthetically from ecgonine, prove the perfect identity of the two bases. A. Einhorn and A. Marquardt report that by the action of potash on ecgonine they have obtained a dextro-rotatory base capable of yielding a synthetical dextro-rotatory cocaine, which, though differing essentially from ordinary cocaine in its physical characters, agrees with it in its physiological action. A body very similar to this *dextro-cocaine*, and probably identical with it, is described by Liebermann and Giesel under the name of *methyl-cocaine*, as a by-product in the commercial synthesis of cocaine.

A crystalline compound of caffeine and mercuric chloride is reported upon by R. H. Davies in a communication to the recent meeting of the British Pharmaceutical Conference. It is obtained as a precipitate on mixing solutions of the alkaloid and of mercuric chloride, and is stated to be sufficiently insoluble in an excess of the latter to admit of the reaction being used as a qualitative test. Ethoxycaffeine, which some time ago was strongly recommended for migraine, forms the subject of a report by H. Thoms.

The constitution of hydrastine, the alkaloid of *Hydrastis canadensis*, has been further investigated by Freund, Lachman, Rosenberg, Kerstein, and E. Schmidt, with results confirmatory

of the view that this base contains one methoxyl group less than narcotine. As yet the conversion of the former into the latter has not been effected. A new oxidation-product of hydrastine, described under the name *hydrastinic acid*, has been obtained by carrying the oxidation by means of potassium permanganate beyond the formation of hydrastinine. A report on berberine by E. Schmidt deals with the purification of this alkaloid.

R. Kobert calls attention to the resemblance of the physical, chemical, and therapeutic properties attributed to cytisine, the alkaloid from laburnum, with those of ulexine, the alkaloid of *Ulex Europæus*, and suggests the probability of the two bodies being identical. This view, however, is opposed by A. W. Gerrard and W. H. Symons, on the ground that the observed differences in some of the physical characters of these bases are too distinct to justify such a conclusion.

In a further report on the volatile alkaloid discovered by him in ipecacuanha, M. Arndt points out the disturbing influence this constituent may be likely to exercise on determinations of emetine in the root. The proportion in which it is found to occur in the root is stated to amount to no less than one-third to one-half of the emetine present.

Digitalin has again received the attention of A. Arnaud, who upholds the view that the crystallized preparation obtained by Nativelle's method is a distinct chemical principle of marked individuality, and supports his opinion by showing that there is practically no difference in the melting-point of the different portions obtained by fractional solution. The same author also deals with the distinctive characters of digitalin and tanghinin. Senegin, the glucoside of senega root, is found by A. Funaro to have a composition corresponding to the formula $C_{32}H_{52}O_{17}$, which differs from that given by Rochleder. He appears to consider senegin and saponin as different compounds. T. E. Thorpe and H. H. Robinson have investigated the glucoside of *Rhamnus frangula*, and assign to it the formula $C_{22}H_{22}O_6$. They have also examined the yellow product obtained from frangulin by hydrolysis, and express themselves satisfied as to its identity with emodin from rhubarb.

New and important information is furnished by H. Stillmark respecting the poisonous principle of castor-oil seeds, which had hitherto been variously represented as an alkaloid, a glucoside, and an organic acid. It is now shown to be an albuminoid body belonging to the class of unformed ferments, and probably identical with an albumose separated from the dried juice of *Carica*

Papaya by Sidney Martin. It is described, under the name of "ricin," as a most potent poison, exercising a remarkable power of coagulation on the blood, and proving fatal to adults in doses of 3 grains, a quantity contained in the press cake from about 48 grains of peeled seeds. Toxic albumoses of a similar nature are said to be contained in the seeds of *Croton Tiglium* and *Jatropha Curcas*.

A. Gantier and L. Mourgues have continued their researches on the active constituents of cod-liver oil, and supply a fuller description of the various alkaloidal and other principles they have isolated from it. They attribute the therapeutic value of the oil partly to the power of these active principles to increase excretion and appetite, and partly to the presence of food-substances in a highly assimilable form. The phosphorus and iron contained in the oil are stated by M. Unger to exist in it in combination with albumen. He finds that in good qualities of the oil, the albuminoid constituents have undergone no alteration, while in inferior qualities they gradually decompose. In his opinion, pharmacists should require that the amount of free fatty acids contained in cod-liver oil shall not exceed 4 to 5 per cent., and that the oil in contact with nitric acid of 1.40 sp. gr. shall form an albuminous ring within five hours. Reporting upon linoleic acid, A. Reformatsky states that the formula of this acid is not $C_{16}H_{28}O_2$, as hitherto assumed, but that it consists principally of the compound $C_{18}H_{32}O_2$. According to R. Benedikt and K. Hazura, this acid seems to occur in all vegetable fatty oils.

Under the name of "camphamines," two new bases derived from camphor are described by P. Cazeneuve. One of these is crystalline, the other amorphous. Both are formed on heating chlorocamphors with saturated aqueous solution of ammonia in sealed tubes. The preparations known as naphthol-camphor and salol-camphor are reported by M. Désesquelle to possess considerable solvent powers as regards iodine, cocaine hydrochlorate, and the cinchona alkaloids. The same author also confirms the valuable antiseptic properties of these compounds.

The impurities liable to occur in commercial salicylic acid form the subject of a report by B. Fischer, in which it is pointed out that the use of impure phenol containing cresol results in the contamination of the product with cresotic acids, and that the presence of potash in the sodium hydrate employed occasions the formation of parahydroxybenzoic acid. The latter impurity is also produced if the temperature is too low at the time when the current of carbonic anhydride is passed, whilst too high a

temperature at this stage results in the production of hydroxyisophthalic acid, due to the action of the gas on the sodium salicylate already formed. The same report also deals with the methods by which these various impurities may be detected. I. Remsen and W. M. Burton give directions for the analysis of commercial saccharin, which is shown to be a mixture of benzoic sulphinide, parasulphaminebenzoic acid, and hydrogen potassium orthosulphobenzoate, the amount of the actual sweetening agent (benzoic sulphinide) present being somewhat less than 50 per cent.

H. Trommsdorff gives a detailed account of the physical and chemical properties of a number of metallic compounds of di-iodoparaphenolsulphonic acid which have now been adopted to some extent in medical practice under the name of "sozoiodol salts." M. Messinger and G. Vortmann direct attention to some iodized phenols obtained by heating a solution of iodine in potassium iodide with an alkaline solution of phenol in the presence of potassium hydrate. Thymol, under the same conditions, is stated to yield a red compound which is intended to be introduced into medicine as a substitute for iodoform under the name of "annidalin." A similar body is described by Dr. Eichhoff under the name "aristol," and represented as dithymol, in which two atoms of hydrogen are replaced by an equivalent proportion of iodine.

The complete synthesis of grape sugar has been accomplished by E. Fischer, and may be regarded as one of the most interesting achievements of the year. The first step in this operation consists in the conversion of *d*-mannonic acid into gluconic acid, which is effected by heating the former with quinoline and water. The gluconic and mannonic acids are separated by a process based on the different solubilities of their brucine salts, and the former is purified by treating with phenylhydrazine, then converting the hydrazide into the calcium salt, and decomposing this by precipitation with oxalic acid. By a suitable treatment with sodium amalgam, the gluconic acid yields a sugar which, after sufficient purification, corresponds in every respect to pure glucose.

W. R. Dunstan and T. S. Dymond have investigated the conditions under which hydrogen peroxide is formed from ether, and find that this formation takes place when ozone acts on ether in the presence of water; also when certain conditions are maintained during the slow combustion of ether in contact with water. Contrary to usual statements, they find that pure ether, either wet or dry, does not form hydrogen peroxide by exposure to light. The presence of vinyl alcohol as a constant impurity in commercial ethyl ether is pointed out by T. Poleck and K. Thümmel.

The well-known action of polyhydric alcohols on borax or boracic acid is shown by L. Lambert to be shared also by arabite, arabinose, dulcitol, and sorbite, as well as by pyrogallol, catechol, and alkaline tannates and gallates, but not by polyglucosides, quercitol or inosite.

E. Harnaek has succeeded in obtaining albumen in a high state of purity by repeatedly dissolving and precipitating albuminate of copper and regenerating the albumen from the copper compound. In this condition it was found to leave no ash on ignition, to stand boiling without coagulation, and to form no precipitate with alcohol, ether, carbolic acid, or tannin. The amount of sulphur contained in it was 1.91 per cent. The proteïds of white of egg coagulable by heat are found by G. Corin and E. Berard to consist of two members of the globulin and three of the albumen class, while those which do not coagulate on heating are regarded as peptones. Considerable importance attaches to the so-called "toxalbumens," which have recently been investigated. It appears that the toxic action of pathogenetic microbes is not wholly due either to the microbes themselves or the alkaloids they secrete, but is attributable in some cases to poisonous albumoses. An albumose of this description has been obtained by Hankin from cultures of the anthrax bacillus, and is stated to exercise a marked influence on the development of the anthrax disease. Brieger, Frankel, and others have isolated a similar body from cultures of the diphtheritic bacillus.

The ptomaine discovered by Brouardel, and described as being analogous to veratrine, has been further investigated by A. M. Delèzinier, and is regarded by him as a secondary monamine of the formula $C_{32}H_{31}N$. A. P. Luff has isolated an alkaloid from the urine of a typhoid patient, and another from scarlet-fever patients, both of which are stated to differ in their reaction from any of the known ptomaines.

An examination of cerebrospinal fluid by W. D. Halliburton confirms previous observations of the almost constant occurrence of albumoses in this liquid. The reducing substance contained in it appears to give the characteristic reaction of catechol, but its precise nature remains yet to be determined. A sample of cerebrose prepared from phrenosin, examined by H. T. Brown and G. H. Morris, proves to possess properties indicating its identity with galactose. The chemistry of saliva forms the subject of an interesting account by O. Sticker; while a similar report on human bile is furnished by S. M. Copeman and W. B. Winston. The existence of Reyhler's artificial diastase (*Year-Book*, 1889, p. 89) is

called in question by C. J. Lintner and F. Eckhardt, who consider the substance described under this name as probably identical with the ferment of ungerminated grain, and not as a conversion-product of gluten. The retarding influence of saccharin on the action of the digestive ferments is confirmed by M. Stiff, who therefore regards this substance as injurious to health. Referring to the reducing substances liable to occur in urine, H. H. Ashdown considers glycuronic acid to be the most important of these, and the one most likely to be mistaken for sugar. A ready means of distinguishing it from the latter is afforded by the failure of yeast to cause alcoholic fermentation. Another report on urine by S. West, deals with the conditions under which acetone and the unknown substance giving the red coloration with ferric chloride occur in it, and with the supposed relation of their presence to diabetic coma.

A few of the subjects connected with inorganic chemistry which have found a place in this volume may be very briefly alluded to in this place. G. Kassner shows that a steady current of oxygen can be readily obtained without heat by the gradual action of solution of hydrogen peroxide upon a strong solution of potassium ferricyanide. The same object may be attained, according to J. Volhard, by allowing a solution of hydrogen peroxide to act in a Kipp's apparatus on bleaching powder previously compressed into a cake and broken up into fragments. A simple and convenient mode of purifying iodine, recommended by F. Musset, consists in fusing the commercial element under cover of a strong solution of potassium iodide, and then washing the product with water. The formation of nitrous acid from ammonia in potable water is attributed by J. E. Enklaar to the influence of microbes, probably identical with the bacteria which play an important part in nitrification. In a report on the constitution of bleaching powder, E. Koefoed rejects the formula Ca O Cl_2 , and adduces arguments in support of the older theory, regarding this preparation as a mechanical mixture of calcium chloride and hypochlorite. C. H. Bothamley, in a paper read before the British Pharmaceutical Conference, refers to the variable and unsatisfactory nature of commercial alkaline bisulphites and their great tendency to decomposition, and points out the superiority and greater constancy in composition of the anhydrosulphites. In another communication to the same meeting W. Martindale and W. A. Salter deal with the question of overcoming the instability of green iodide of mercury, and suggest for this purpose the use in its preparation of an excess of mercury amounting to one-fourth of the theoretical quantity. G. S. John-

son directs attention to the appreciable solubility of white precipitate in ammonium carbonate, and to the consequent loss caused by the presence of this impurity in the ammonia employed in the preparation of this compound. The so-called double cyanide of zinc and mercury, which is recommended by J. Lister as a valuable antiseptic, has engaged the attention of W.R. Dunstan, whose investigation tends to prove that this preparation is not a chemical combination of the cyanides of zinc and mercury, and also to dispose of the hypothesis that it contains an hydroxycyanide of either metal combined with a cyanide of the other.

Analytical chemistry has again yielded numerous contributions to the chemical literature of the year, and a brief sketch of some of the work done in this direction may not be out of place in this introductory chapter. In a report on Schützenberger's process for the estimation of oxygen dissolved in water, H. E. Roscoe and J. Lunt call attention to the notable loss of oxygen by diffusion during the titration in an atmosphere of hydrogen. To eliminate this error, they propose to run the aërated water beneath the surface of a liquid containing a measured excess of hyposulphite, and a little reduced indigo carmine as an indicator. J. C. Thresh effects the estimation of dissolved oxygen by a process based on the fact that nitric oxide, liberated in the interaction of nitrous and hydriodic acids, combines with any free oxygen present, thus reproducing nitrous acid, and causing a further liberation of iodine proportional to the amount of oxygen consumed, which is estimated by means of hyposulphite. The operation is conducted in an apparatus charged with coal-gas. In a communication to the recent meeting of the British Pharmaceutical Conference, the same author deals with the various conditions affecting the delicacy of the iodide test for the detection of nitrites in potable waters, and shows how advantage may be taken of these conditions for the purpose of a simple and trustworthy quantitative process. He also points out that the formation of nitrites in water, and also their disappearance, may occur within a very short space of time, an observation indicating the importance of studying these and other changes which may take place in suspicious waters. A solution of resorcin in strong sulphuric acid is recommended by E. Merck as an extremely delicate reagent for nitric acid, with which it forms a deep blue coloration. T. M. Drown and H. Martin, and likewise H. Leffmann and W. Beam, publish their experience respecting the estimation of organic nitrogen in natural waters by means of the Kjeldahl process. The untrustworthiness of the soap test for the determination of high degrees of hardness in water, especially in

waters rich in magnesia, is demonstrated both by A. H. Allen and E. Waller.

The disturbing influence of iron on the gravimetric estimation of sulphuric acid is shown by P. Jannasch and T. W. Richards to be attributable to the precipitation of the iron as a double sulphate of iron and barium, and the decomposition of this compound with a loss of sulphuric acid during ignition. Replying to adverse comments, recently published by B. North, A. Gawalowski re-affirms the accuracy of his method for the volumetric estimation of sulphuric acid. A convenient process for the detection and estimation of sodium in lithium carbonate, suggested by W. H. Symons, is based upon the comparative insolubility of sodium chloride in strong hydrochloric acid, in which lithium chloride is readily soluble. R. Fresenius confirms the soundness of the objections raised by P. Schweitzer to H. Rose's method for the separation of barium from strontium, showing that neither the treatment of the precipitated sulphates with solution of ammonium carbonate, nor the boiling with a mixed solution of potassium carbonate and sulphate, affords a satisfactory mode of separation. The quantitative separation of arsenic from antimony is effected by O. Koehler in a hot solution in concentrated hydrochloric acid by means of sulphuretted hydrogen. The action of hypophosphites on arsenical solutions forms the basis of a delicate test proposed by G. Looff. A. Voigt recommends a modification of the ferrocyanide process for the volumetric estimation of zinc, which is carried out in the presence of potassium tartrate, ammonia, and a few drops of ferric chloride. For the qualitative separation of copper from cadmium, J. H. Kastle prefers the removal of the copper by means of metallic iron to the usual methods. The facility with which iron displaces copper from solutions of its salts is also turned to account by H. D. Fuge in a process for the volumetric assay of reduced iron.

A new test for the purity of quinine sulphate is suggested by E. Hirschsohn, and consists in the treatment of the sample with a mixture of petroleum ether and chloroform, and the addition of a further quantity of petroleum ether to the filtered liquid. The clearness of the mixture is stated to indicate the purity of the salt. Cocaine may be detected, in the presence of other bases, as shown by K. Mezger, by the precipitation of an insoluble chromate on the addition of chromic acid to solutions of the alkaloid in the presence of free hydrochloric acid. The precipitation of strychnine and brucine by picric acid, and the destruction of brucine picrate on heating with nitric acid, serve as the basis of a new quantitative process for the separation of these two alkaloids.

Various colour reactions are described for the identification of saccharin, antifebrin, phenacetin, exalgin, and sulphonal.

A comparative examination of the principal tests for methylated spirit leads A. J. Millard and A. C. Stark to the conclusion that Cazeneuve's test is the most delicate and convenient for the purposes of the pharmacist, though even this appears to be not quite so satisfactory as could be desired. H. W. Snow has extended to a number of essential oils Hübl's process for the detection of adulteration in fixed oils. The results of his experiments afford an indication that the iodine absorption of essential oils may yield figures of considerable value in the determination of their purity. Want of space does not permit us to allude in this place to the reports on the analysis of articles of food and of commercial products which have met with notices in this volume.

We have already referred to one of the series of investigations carried out in the research laboratory of the Pharmaceutical Society respecting the rhizome of *Scopola carniolica*, a drug which was offered in the market under the name of *Belladonna Scopolia*, as a substitute for the root of *Atropa Belladonna*. The histological characters of this drug have been studied side by side with those of belladonna root by T. Greenish, whose results establish a close alliance in anatomical structure between the two. An interesting account of the natural history of this plant is furnished by E. M. Holmes. The therapeutic action of the rhizome has been investigated by Sir Dyce Duckworth, who records a number of clinical observations leading to the conclusion that *Scopola* is a drug equal in its effects to *Belladonna*. F. Ransom deals with the pharmacy of the subject, and gives directions for the preparation of an alcoholic extract, a liquid extract, a plaster, a liniment, a tincture, and an ointment of *scopola*, all of definite alkaloidal strength. A microscopical examination of the rhizome of *Scopola japonica*, by E. Collin, shows a very close agreement in anatomical structure with *Scopola carniolica*.

E. M. Holmes reports on the success attending the cultivation of belladonna, henbane, foxglove, and aconite grown in Cambridge-shire, and gives a very favourable account respecting the results obtained with the last-named plant. Owing to the remarkable uniformity manifested by the whole of the aconite plants, he is inclined to regard their roots as more dependable than the foreign drug, either for use in medicine or for chemical analysis. In an interesting contribution to the British Pharmaceutical Conference, A. W. Gerrard discusses the alkaloidal value of biennial henbane, and arrives at the conclusion that the preference shown for the

leaves of this variety over those of the annual henbane is not well-founded.

The claim of the rhizome of *Chamæcirium luteum* to a place in the materia medica is revived by H. R. Slack, who ascribes to it valuable tonic, emmenagogue, and alterative properties. The bark of the Panbotano, a leguminous tree of Mexico, is recommended by M. Valude as an efficient antipyretic suitable as a substitute for sulphate of quinine. Cocillana bark, a Bolivian drug, is reported to be a useful expectorant. Tumbeki (*Nicotiana Persica*) is classed by A. E. Robinson with intestinal convulsants, such as Calabar bean and nux vomica, and is stated to possess in a marked degree the power of diminishing the inhibitory action of the vagus nerve. F. W. Anderson reports that the leaves of *Anemone cylindrica* and *Anemone multifida* are used by Indians of the Rocky Mountains in the form of snuff as a remedy for nasal and pharyngeal catarrh. J. Russell Reynolds and C. Lawrence offer favourable testimony as to the value of *Cannabis indica* as a sedative and hypnotic in various forms of neuralgia, epilepsy, chorea, and renal diseases. The merits of *Solidago virgaurea* as a diuretic in the treatment of cardiac dropsy are confirmed by M. Mascarel. Corroborative evidence is also furnished by G. M. Garland respecting the value of *Euphrasia officinalis*, administered in the form of a tincture, in the treatment of fresh colds. The berries of the horse-nettle, *Solanum carolinense*, which have some reputation among the negroes in South Carolina as an aphrodisiac, are shown by J. L. Napier to be very useful in combatting epilepsy and other convulsive disorders. The reputed value of Kola nuts as an efficient substitute for tea, particularly for those affected with diarrhoea, receives further support from the results of experiments by R. H. Firth. The superiority, in some respects, of senna pods over the leaves is pointed out by A. W. Macfarlane, and confirmed by E. F. Salmon. They are reported to possess the laxative properties of the leaves, and not to be liable to cause griping or other unpleasant symptoms. Directions for the preparation of an essence or fluid extract of the pods are given by C. Symes.

Attention is called by F. A. Flückiger to the fact that jalap roots now rarely yield more than twelve and sometimes only seven and a half per cent. of resin, while in 1842 they yielded as much as seventeen per cent. It is suggested that the Mexican dealers extract the resin from the roots by treatment with alcohol. Dealing with the extraction of podophyllum resin from the rhizome, C. G. Dunn states that the most active constituents of this resin are contained in the first portion of the alcoholic percolate. W.

Dymock and D. Hooper report on *Podophyllum Emodi*, showing that the rhizome and rootlets of this Asiatic representative of the genus, compared with those of *Podophyllum peltatum*, yield a much larger proportion of a purgative resin, possessing the physical and chemical properties as well as the physiological action of podophyllin. The root of *Scutellaria lanceolaria*, a member of the *Labiatae*, used medicinally in China and Japan, has been examined by D. Takahashi, who has extracted from it a crystalline principle which he believes to be a phenol. *Scutellaria lateriflora*, which enjoys some reputation as a nervine, and has also been suggested in the treatment of hydrophobia, has yielded to C. O. Myers a crystallizable glucoside apparently identical with the bitter principle previously isolated by Gassicourt. The root of *Stylophoron diphyllum* is shown by F. Selle to owe its activity to chelidonine. A comparative examination of *Krameria triandra* and *Krameria argentea*, by R. G. Dunwoody, indicates that the latter is somewhat lower in tannin strength, as well as in other constituents, than true rhatany. H. Trimble has isolated from the rhizome and rootlets of *Eupatorium purpureum* a yellow crystalline principle not identical with either quercitrin or quercetin. A yellow crystalline principle has also been obtained from the root of *Ophioxylon serpentinum*, an apocynaceous plant used in East India as a purgative and anthelmintic. A further investigation of the root bark of *Euonymus atropurpureus* has enabled W. A. H. Naylor and E. M. Chaplin to identify the constituent previously described under the provisional name of atropurpurin as dulcete, or an isomer of the same. They further find that the best menstruum for the preparation of a liquid extract of this bark is a mixture of four volumes of rectified spirit and one of water. The same chemists have examined a number of trade specimens of euonymin, with results exhibiting considerable variation in their composition. A menstruum of dilute alcohol for the extraction of cascara sagrada is recommended by A. C. Zeig on the ground that it removes the active resinous principle without dissolving any appreciable proportion of the two inert resins. J. Findlay expresses a doubt that the laxative effect of this bark is entirely due to resinous constituents insoluble in water, since he finds an aqueous extract to be almost as active as one obtained with dilute alcohol. A formula for the preparation of a tasteless fluid extract of cascara sagrada is published by H. M. Beck. The bark of *Oroxyllum Indicum* forms the subject of two contributions to the British Pharmaceutical Conference by E. M. Holmes, and W. A. H. Naylor and E. M. Chaplin. This bark, which is credited with astringent, tonic, and

sudorific properties, is referred to a plant belonging to the order *Bignoniaceæ*, and is shown to contain a characteristic yellow crystalline principle which is described under the provisional name "oroxylin." The bark of *Pogonopus febrifugus*, known in Bolivia and the Argentine Republic under the name of "quina morada," and used as a substitute for cinchona bark, is found by P. N. Arata and F. Canzoneri to contain a fluorescent constituent (moradin), and an alkaloid (moradeine). H. Moissan calls attention to a true cinchona bark containing aricine in the entire absence of quinine and cinchonine. The poisonous properties of the bark of *Robinia pseudacacia* are traced by F. B. Power and J. Cambier to the presence of an albumose. The wood of *Picrasma quassioides* has been investigated by W. Dymock and C. J. H. Warden, who have isolated a crystallizable principle resembling quassiin, a fluorescent bitter resinoid, and an amorphous bitter resin, and have also obtained indications of an alkaloid. From *Chelidonium Majus*, E. Schmidt has obtained, in addition to chelidonine and chelerythrine, a considerable number of new alkaloids which are still under investigation. *Eschscholtzia californica* is shown by L. Reuter to contain a glucoside and two alkaloids, but neither of the latter presents the similarity to morphine attributed to the base recently described by Adrian and Bardet. A. Schneider has extracted the fluorescent constituent of *Nigella damascena* from the testa of the seed, and has ascertained it to be an alkaloid. The alleged presence of caffeine in the berries known as "Mussænda coffee" is disproved by W. R. Dunstan, who also reports that these berries are not derived from a species of *Mussænda*, but from *Gærtnera vaginata*, a member of the order *Loganiaceæ*.

C. J. S. Thompson discusses the comparative medicinal values of the three kinds of buchu leaves official in the British Pharmacopœia, and arrives at the conclusion that the leaves of *Barosma serratifolia*, being deficient in essential oil and other constituents, as compared with the two other kinds, should no longer be employed in pharmacy. A chemical comparison of different kinds of manna, by D. Hooper, shows a great variation in solubility and composition of this drug. The same author also furnishes an account of "mussambra," an inferior variety of East Indian aloes probably prepared from *Aloe vulgaris*. The behaviour of different kinds of aloes towards various reagents has been studied by J. Bainbridge and C. Morrow. J. H. Maiden supplies some interesting information respecting the so-called "Botany Bay" or *Eucalyptus Kino*, in which he refers to the products of no fewer than

thirty different plants, and divides these into three different groups in accordance with their solubility and the appearance of their solutions. A report on *Sterculia* gums by the same investigator deals chiefly with the similarities and dissimilarities of these to tragacanth. Wattle gum, the produce of many Australian species of *Acacia*, is considered by the same author not to prove a likely substitute for Khordofan gum; and a similar opinion is expressed by C. F. Henry with reference to gum ghatti, and with regard to Persian gum, the probable produce of species of *Prunus* by E. Sickenberger.

W. Kirkby directs attention to a new adulteration of saffron, consisting of the fibres apparently derived from a species of sedge, which he discovered in a sample to the extent of 41 per cent. A sample of spurious cloves is reported upon by T. F. Hanausek. The frequent adulteration of insect powder with the flowers of *Chrysanthemum leucanthemum* is referred to by M. Unger, who shows that the large proportion of ash yielded by the latter affords a means of detecting this fraud. R. A. Cripps deals with the detection of adulteration in oil of rosemary, and the same service is performed for the oils of cassia and cinnamon by H. Gilbert and E. Hirschsohn. The detection of adulteration in castor oil forms the subject of reports by H. Gilbert and M. Conroy.

A new antiseptic has been introduced into medicine under the name of sulphaminol, and is stated by E. Merck to be thio-oxydiphenylamine, which, when administered internally, undergoes decomposition, and produces the action of phenol and sulphur. Another antiseptic of recent introduction is guaiaicol-carboxylic acid, which is also credited with considerable antipyretic properties. Confirmatory evidence respecting the value of chloroform for preserving infusions and other pharmaceutical preparations is supplied by J. F. Burnett and H. Wyatt. Several new compounds have again been added to the list of antipyretics, viz. acetylenephénylhydrazin, ethylenephénylhydrazinsuccinic acid, and orthohydrazinparahydroxybenzoic acid, the last of which is introduced under the name "orthin." A very useful resumé of the principal synthetic remedies already employed in medicine is furnished by J. Hodgkin, in a paper read before the Leeds meeting of the British Pharmaceutical Conference. A body resulting from the union of chloral, alcohol, and urethane is introduced as a new hypnotic under the name of "somnal," and is stated to be preferable to chloral hydrate or urethane on account of its freedom from objectionable after-effects. The same advantage is claimed for two other new hypnotics, which are described under the respective

names of "chloralamide" (chloralformamide) and chloralimide. The latter of these is also reported to possess powerful antipyretic properties. The name "hypual" is applied to a combination of chloral hydrate and antipyrine, described by Béhal and Choay, Bardet, and L. Reuter. The latter seems to regard this compound as therapeutically inert, while Bardet speaks of it as partaking in a marked degree of the properties of both its constituents.

The introduction of a standardized extract of *nux vomica* does not appear to have led to the desired uniformity in the strength of this preparation. A short time ago it was pointed out that its strength varied considerably in accordance with its varying and changeable consistence; and now it is shown by H. Beckurts that the mere percentage of total alkaloids is no proper criterion of the medicinal strength of the extract, since there is a very notable variation in the relative proportions of strychnine and brucine, the former of which is considered to be nearly forty times as active as the latter. J. C. Umney comments on the want of uniformity in malt extracts, and publishes directions for the preparation of a liquid extract of fairly definite diastatic strength, while D. B. Dott and also R. A. Cripps deal with the methods of ascertaining the strength of commercial preparations of this kind.

G. Lunan suggests an alteration in the process for the preparation of ammoniated tincture of quinine, consisting in the substitution of ammonium carbonate for the hydrate. The product is stated to form a clear solution with a much smaller proportion of water than is the case with the official tincture. The question as to the best menstrua for preparing a number of pharmacopœial tinctures is discussed in two papers communicated by R. Wright and E. H. Farr to the British Pharmaceutical Conference. Tests for the identification of a number of tinctures are described by F. X. Moerk. C. D. Moffat pleads in favour of the retention of concentrated infusions and decoctions, and deals with the methods best calculated for their production. An improvement in the preparation of syrup of hypophosphite of iron is proposed by J. Macintyre.

We forego notices of many other subjects treated of in this volume, since it appears to us desirable not to extend the Introduction beyond the usual limits.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

A New Method of Preparing Oxygen. G. Kassner. (*Chem. Zeitung*, xiii. 1302, 1338.) Potassium ferricyanide dissolved in a little water is mixed with a 3 per cent. solution of hydrogen peroxide in a flask furnished with a delivery tube and a tap funnel, through which solution of potassium hydrate is gradually added. Oxygen is thus liberated in accordance with the following equation:



58 grams of potassium ferricyanide and 100 c.c. of 3 per cent. solution of hydrogen peroxide yield 2 litres of oxygen. The ferrocyanide formed in the reaction is a valuable by-product, which can be readily reconverted into ferricyanide by the usual process.

Preparation of Oxygen. J. Volhard. (*Liebig's Annalen*, ccliii. 246-248.) Solution of hydrogen peroxide acidified with nitric acid yields a steady current of oxygen when allowed to act in a Kipp's apparatus on bleaching powder previously compressed into a cake and broken up into small fragments. The oxygen thus obtained may contain small quantities of chlorine and carbon dioxide, which can be removed by passing the gas through a wash bottle filled with solution of potassium hydrate.

Preparation of Chlorine. J. Thiele. (*Liebig's Annalen*, ccliii. 239-242.) A steady current of chlorine is readily obtained in a Kipp's apparatus, by the action of hydrochloric acid on bleaching powder previously compressed into a hard cake and broken up into small pieces.

The Action of Hydrochloric Acid on Manganese Dioxide. H. M. Vernon. (Abstract of a paper read before the Chemical Society, April 3, 1890. From the Society's Proceedings.) The author's results confirm the view expressed by W. W. Fisher in 1878, that the original product of the action of hydrochloric acid on manganese dioxide is *manganese tetrachloride*, and that no chlorine is formed in the first part of the reaction.

Purification of Iodine. F. Musset. (*Pharm. Centralhalle*, 1890, 230.) Iodine may be purified as follows: A convenient quantity of iodine is placed in a beaker and covered with a concentrated solution of iodide of potassium, the beaker covered with a watch glass, and heat applied until the iodine melts. After the beaker and contents become cool, the iodine cake is removed, broken up, and after draining in a funnel washed with water. The product is free from chlorine and is easier obtained in this condition than by resublimation; the mother liquor is reserved for future operations.

Iodic Acid. H. Lescœur. (*Bull. de la Soc. Chim.* [3], i. 563.) Iodic acid crystallizes from strong nitric acid in the anhydrous state, and from dilute nitric acid as monohydrate. If crystallized from nitric acid of intermediate strength, mixtures of the anhydrous and monohydrated acid are obtained.

Formation of Hydrobromic and Hydriodic Acids. V. Merz and E. Holzmann. (*Ber. der deutsch. chem. Ges.*, xxii. 867-872; *Journ. Chem. Soc.*, August, 1889.) The synthesis of hydrobromic acid from its elements can be demonstrated by passing dry hydrogen through a fractionating flask containing boiling bromine, and conducting the gaseous mixture through a tube provided with one or two bulbs, and heated at the commencement of the operation for a short portion of its length. Combination takes place and tongues of flame, two or more inches long, are visible in the tube; in presence of excess of hydrogen the flame is distinctly yellow. Another method is to place a hydrogen flame near the mouth or into the neck of a flask of about 1 litre capacity, containing boiling bromine; the size of the flame is thereby considerably increased. The best method, however, is to introduce a hydrogen flame into a flask containing bromine and filled with oxygen, and then heat immediately; hydrobromic acid is formed, and as long as the supply of bromine is kept up the size of the flame is greatly increased.

Colourless fuming hydrobromic acid can be prepared by the above reaction. A rapid stream of hydrogen is passed into a flask containing boiling bromine, the mixed vapours conducted first

through a short combustion-tube containing broken glass covered with charcoal and heated to dull redness, then into a Woulf's bottle, into which a second stream of hydrogen is passed, and finally through a heated glass tube into cold water.

When hydrogen and iodine vapours are passed through a red-hot tube containing pumice, a considerable quantity of the iodine is converted into hydriodic acid; and if the escaping gas is filtered through cotton-wool and passed into cold water, colourless hydriodic acid is obtained. Experiments were made to determine the quantity of hydriodic acid formed in a given time from a given quantity of iodine at various temperatures. The results showed that the higher the temperature the larger the quantity of hydriodic acid produced.

Sodium is not acted on when heated at 200° , 250° , or 300° with pure bromine or with bromine containing considerable quantities of iodine; iodine alone has also no action on sodium at 350 – 360° .

Some sodium which has been kept in bromine since 1873 still retains its metallic lustre.

Diffusion of Acids and Bases into One Another. J. Stefan. (*Monatshefte*, x. 201–219.) When very dilute ammonia is placed over a column of dilute hydrochloric acid, the surface of separation between the acid and the alkaline liquids remains well-defined, as can be easily observed if the solutions are coloured with litmus, but the region occupied by the acid gradually extends upwards. The author has fully investigated the rate of this diffusion with different acids and under varying conditions of concentration, etc. For particulars, reference should be made to the original paper.

Formation of Nitrous Acid from Ammonia in Potable Water. J. E. Enklaar. (*Rec. Trav. Chim.*, viii. 327, 328.) The author finds that the formation of nitrous acid from ammonia occurs far less in distilled than in ordinary water, and that it may be entirely checked in the latter by boiling the water before the experiment. The oxidation of ammonia is attributed to the influence of microbes, probably identical with the bacteria, which play an important part in nitrification. These microbes do not seem to develop in distilled water, but they multiply rapidly in water containing calcium carbonate and organic matter; they are killed or rendered inactive by free acids.

Specific Gravity of Ammonia Solutions. G. Lunge and T. Wiernik. (*Zeitschr. für angew. Chem.*, 1889, 181–183.) Very carefully conducted redeterminations have given the following results:—

Specific gravity at 15°.	Percentage of N H ₃ .	Correction of the sp. gr. for $\pm 1^\circ$.	Specific gravity at 15°.	Percentage of N H ₃ .	Correction of the sp. gr. for $\pm 1^\circ$.
0.990	2.31	0.00020	0.930	18.64	0.00042
0.980	4.80	0.00023	0.920	21.75	0.00047
0.970	7.31	0.00025	0.910	24.99	0.00052
0.960	9.91	0.00029	0.900	28.33	0.00057
0.950	12.74	0.00034	0.890	31.75	0.00061
0.940	15.63	0.00039	0.880	35.60	—

Specific Gravities of Aqueous Solutions. G. T. Gerlach. (*Zeitschr. für Analyt. Chem.*, xxviii. 466–524; *Journ. Chem. Soc.*, November, 1889.) The author gives numerous tables of the specific gravities of salt solutions, and deduces the following conclusions from them:—

1. The water of crystallization of salts always occupies in solution the same volume as an equal weight of solvent water.

2. When a salt crystallizes with several proportions of water, the smaller the number of molecules of water of crystallization, the greater is the space each molecule occupies in the solid form.

3. It would therefore appear that salts in solution are not in combination with water of crystallization, but that the union takes place in the act of solidification.

4. On mixing equal volumes of two solutions containing the proportions for the formation of a double salt, a very insignificant contraction occurs.

5. Since the solubility of double salts is often very different from that of their constituent salts, it would appear that these double salts have a real existence in solution.

6. The differences in the molecular volumes of salts of analogous elements and similar constitution are equal to the differences between their molecular weights.

7. The molecular volume of a substance in aqueous solution diminishes with increasing concentration of solution. In different solvents the molecular volumes of the dissolved substance are not identical, but always closely approximate.

The Absorption of Carbonic Anhydride by Mixtures of Alcohol and Water. O. Müller. (*Ann. Phys. Chem.* [2], xxxvii. 24–43.) The author finds that the coefficient of absorption diminishes as the proportion of alcohol increases, and reaches a minimum when the solution contains 28 per cent. of alcohol, after which it continues to increase up to the value for absolute alcohol. When the

solution contains about 45 per cent. of alcohol, the value of the coefficient of absorption is about the same as for pure water.

Absorption of Gases by Mixtures of Alcohol and Water. O. Lubarsch. (*Ann. Phys. Chem.* [2], xxxvii. 524, 525.) The author's results are summarized in the following table:—

Percentage of									
Alcohol	0.00	9.09	16.67	23.03	28.57	33.33	50.00	66.67	80.00
Oxygen	2.98	2.78	2.63	2.52	2.49	2.67	3.50	4.95	5.66
Hydrogen . . .	1.93	1.43	1.29	1.17	1.04	1.17	2.02	2.55	—
Carbonic Oxide .	2.41	1.87	1.75	1.68	1.50	1.94	3.20	—	—

These results are similar to those obtained by Müller for carbonic anhydride (see preceding abstract); and it is thought probable that other gases will behave in an analogous manner.

The Interaction of Hypochlorites and Ammonium Salts. Ammonium Hypochlorite. C. F. Cross and E. J. Bevan. (From a paper read before the Chemical Society, February 20, 1890. From the Society's Proceedings.) The authors' results afford satisfactory evidence of the formation and existence of ammonium hypochlorite in solution. The isolation of such a compound, however, appears to be attended with considerable difficulty, and all attempts in this direction have hitherto failed.

The Constitution of Bleaching Powder. E. Koefoed. (*Pharm. Zeitung*, 1889, 747.) The author has made experiments upon this substance to ascertain whether it contain the compound Ca O Cl_2 , or whether it be a mixture of calcium chloride and hypochlorite. He finds that chlorinated lime contains both chloride and hypochlorite of calcium, and bases his conclusion upon the following two observations: (1) If an aqueous solution of bleaching powder be dialyzed, the dialysate will contain approximately twice as much calcium chloride as hypochlorite. (2) Chlorinated lime, treated with water, will yield to the solvent considerably more calcium chloride than calcium hypochlorite. These experiments would, in the author's opinion, indicate a mechanical mixture of the two salts and not a definite chemical compound.

Direct Production of Crystalline Sodium Carbonate and Chlorine from Sodium Chloride. W. Hempel. (*Ber. der deutsch. chem. Ges.*, xxii. 2475–2478. From *Journ. Chem. Soc.*) In the electrolysis of metallic chlorides, which give readily soluble decomposition products, the latter are further decomposed as soon as the quantity produced reaches a certain limit. When, however, the compound produced is only sparingly soluble, this secondary decomposition does not take place, and the whole strength of the

current is utilised. Potassium chloride and sodium chloride, for example, can be converted into the corresponding chlorate; calcium chloride and magnesium chloride can be decomposed into chlorine and a solid hydroxide, by employing a diaphragm.

Marx has shown that alkaline chlorides can be directly converted into chlorine and an alkaline hydrogen carbonate, by passing carbonic anhydride through the solution during electrolysis, metal and liquid diaphragms being employed.

The author, who has been engaged independently in making similar experiments, describes, with the aid of diagrams, an apparatus in which sodium chloride can be directly converted into chlorine and crystalline carbonate. The cathode is a perforated iron disc, the anode a perforated carbon disc, the perforations being about 4 mm. in diameter, and bored in an upward direction, to allow the gas to escape freely. A disc of ordinary asbestos paper, placed immediately between the carbon and iron discs, serves as a diaphragm. The three discs are placed in the centre of a vessel made of porcelain and glass, which is thus divided into two chambers, each of which is provided with a conducting tube, in one case for carbonic anhydride, in the other for chlorine. If sodium chloride is added from time to time through a suitable aperture, and the water which is removed with the crystalline carbonate is replaced, the apparatus can be worked continuously, sodium carbonate and almost chemically pure chlorine being obtained.

A tension of 3.2 volts is required for decomposing the sodium chloride, and a tension of 2.5 volts to overcome the polarisation current; but the latter has only a slight tension when both electrodes are made of carbon. With a current of 1.73 ampères 0.93 gram of chlorine per hour was produced; so that if a dynamo were employed, it should give hourly 64.5 grams of chlorine and 259.8 grams of $\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$ per horse-power.

Action of Sulphuric Acid upon Aluminium. A. Ditte. (*Comptes Rendus*, cx. No. 11.) Cold dilute sulphuric acid seems to have no action upon aluminium, yet, as the formation of aluminium hydrate evolves 195.8 calories, this metal should at ordinary temperatures decompose water and dilute acids. The author in this paper demonstrates that such is the case, and that if a plate of aluminium immersed in dilute sulphuric acid seems not to be attacked, the cause is that it becomes coated with a continuous layer of hydrogen, which prevents all direct contact with the liquid.

The Influence of Different Metallic Oxides on the Decomposition of Potassium Chlorate. G. J. Fowler and J. Grant. (Abstract of a paper read before the Chemical Society, February 20, 1890. From the Society's Proceedings.) The authors' chief results are summarized as follows:—

1. Acid oxides, such as V_2O_5 , WO_3 and U_3O_8 , cause the evolution of oxygen at a reduced temperature; a metavanadate, tungstate, or uranate being formed. Chlorine is evolved in these cases in large quantity, but the whole of the oxygen of the chlorate is not evolved, as the compound of K_2O with the oxide is not decomposed either by heat or by chlorine:



2. Alumina probably acts similarly but less energetically, the attraction between the K_2O and Al_2O_3 not being so great.

3. In the case of chromium sesquioxide, the oxygen is evolved at a reduced temperature, accompanied by chlorine. The decomposition may be supposed to be brought about by the affinity of the Cr_2O_3 for O, and the affinity of the CrO_3 thus formed for K_2O ; but all the oxygen of the chlorate is not evolved, since



4. In the case of the sesquioxides of iron, cobalt, and nickel, cupric oxide and manganese dioxide, oxygen is evolved at a comparatively low temperature, accompanied by only a little chlorine; the oxide is left but little altered at the end of the experiment.

Accepting McLeod's theory of the action of manganese dioxide (*Chem. Soc. Trans.*, 1889, 184), which is fully in harmony with the results of the experiments under consideration, it would seem that manganese dioxide first acts by reason of its affinity for oxygen and the affinity of the higher oxide thus formed for K_2O . The permanganate first formed, however, is unstable (here there is a difference between the oxides of this class and those of the preceding), and is resolved into $K_2MnO_4 + MnO_2 + O_2$. The K_2MnO_4 is decomposed by chlorine into KCl and MnO_2 , which is thus regenerated. The addition of sodium carbonate retards the evolution of oxygen, probably because the manganate is thereby rendered more stable. The action of sodium of the other oxides of this class can, it is believed, be explained in a similar manner to that of manganese dioxide.

5. The monoxides of barium, calcium, and lead cause no evolution of oxygen when heated with chlorate, but the latter breaks

up below its normal temperature of decomposition, potassium chloride and a peroxide being formed. Here the affinity of the oxide for oxygen induces change.

6. On the other hand, potassium chlorate may act as a reducing agent in the presence of such oxides as silver oxide and the peroxides of barium and lead, a perchlorate being formed. No oxygen is evolved. Here the change is brought about by the affinity of the chlorate for oxygen. In the case of the oxides of calcium, barium, and lead, the extent to which the chlorate is oxidized evidently depends on the relative masses of the interacting substances.

7. Water of hydration appears to diminish the activity of an oxide, owing doubtless to the absorption of heat necessary for its conversion into steam.

8. The physical condition of the oxide is of influence. Copper oxide prepared in the dry way is almost inactive.

9. Certain substances, although apparently they undergo no chemical change, assist the decomposition, *e.g.*, powdered glass, sand, and kaolin.

10. Oxides such as those of zinc and magnesium are inactive.

The Production of Pure Metallic Copper in a Crystalline Condition. C. C. Duncan. (Abstract of a paper read before the Chemical Society, June 5, 1890.) To a solution containing several grams of purified sulphate acidified with hydrochloric acid, metallic zinc (containing only a trace of lead) was added in small fragments. Dark, spongy-looking copper at once separated, and this soon protected the zinc from the action of the acid; consequently the copper was very slowly deposited; it was found to be in the form of feathery, dendritic crystals.

The product proved to be free from sulphur as well as from zinc.

Notes on Calamine. W. Murton Holmes. (*Pharm. Journ.*, 3rd series, xx. 474.) The author's observations show that calamine is a very variable substance—one that varies considerably in the same vein of ore, and that it would be possible to produce a prepared calamine answering all the Pharmacopœia tests with but a small percentage of zinc in its composition, and containing instead calcium or magnesium. He suggests that in the next edition of the Pharmacopœia the percentage of zinc should be stated, and the source given whence a regular supply of calamine of tolerably uniform quality can be obtained.

Solubility of White Precipitate in Solution of Ammonia containing Ammonium Carbonate. G. S. Johnson. (*Chemical*

News, lix. 234.) The presence of ammonium carbonate in ammonia has a considerable influence in preventing the precipitation of mercuric chloride by the latter, or in rendering it incomplete. After complete precipitation of a solution of mercuric chloride by ammonia, the addition of ammonium carbonate may cause the precipitate to redissolve.

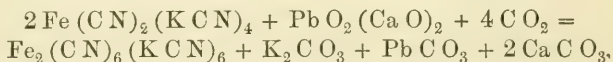
Oxychlorides of Mercury. K. Thümmel. (*Archiv der Pharm.* [3], xxvii. 589-605.) Of the fifteen oxychlorides mentioned by Roucher (*Journ. prakt. Chem.*, xlix. 1850, 377), only five can be considered as definite compounds, namely: the oxydichloride, $\text{Hg O}, 2 \text{ Hg Cl}_2$; monoxychloride, $\text{Hg O}, \text{Hg Cl}_2$; dioxychloride, $2 \text{ Hg O}, \text{Hg Cl}_2$; trioxychloride, $3 \text{ Hg O}, \text{Hg Cl}_2$; and tetroxychloride, $4 \text{ Hg O}, \text{Hg Cl}_2$. All others are either modifications or mixtures of these oxychlorides.

Instability of Solutions of Ferric Bromide. L. L. de Koninck. (*Zeit. ang. Chem.*, 1889, 149.) A solution of ferric bromide is decomposed on boiling. In the presence of excess of bromide the reduction to ferrous salt begins immediately the excess of bromine has been expelled by boiling. In order to obtain a solution of ferric bromide free from ferrous salt, it is necessary, first of all, to have an excess of bromine present, and then to remove this by a long-continued current of cold air passed through the liquid.

Crystallized Phospho-Citrate of Iron. M. Lecerf. (*Amer. Journ. Pharm.*, November, 1889.) At a recent meeting of the *Congrès de Théraputique*, in Paris, the author described this salt as a greenish white crystalline powder, soluble in cold water, very soluble in warm water, and insoluble in alcohol. It oxidizes in the air, taking on a brown colour, which gradually deepens. In making it, a solution of ferrous sulphate is precipitated by an excess of ammonia phosphate; the precipitate, carefully washed, is allowed to macerate for five days at a temperature of 104° in a concentrated solution of citrate of ammonia. This solution is decanted repeatedly until it becomes nearly colourless, and the precipitate has become white. The latter is then rapidly washed with distilled water, and afterwards with alcohol, and is dried under protection from the air.

A New Process for Manufacturing Potassium Ferricyanide. G. Kassner. (*Chem. Zeit.*, xiii. 1701, 1702; *Journ. Soc. Chem. Ind.*, April, 1890.) Of the several methods available for converting potassium ferrocyanide into ferricyanide on the large scale, that involving the use of chlorine is usually employed, on account of its cheapness; but there are objections to its use. Special precautions

have to be taken to avoid the introduction of any excess of chlorine over that required to complete the reaction, otherwise the ferricyanide produced will suffer decrease both in quantity and quality. Another drawback to the use of chlorine is the occurrence of spontaneous explosions in the vessels containing the materials during the oxidation, due, as is commonly explained, to the formation of chloride of nitrogen. These inconveniences could be avoided by the use of peroxide of lead, but the cheapest means of producing that substance has been still too expensive hitherto for competing with chlorine as the oxidizing agent. But a recent invention of the author's has made the use of lead peroxide practicable in the form of calcium plumbate, which is easily obtained by roasting oxide or carbonate of lead with calcium carbonate at a low red heat. In the conversion of potassium ferrocyanide into ferricyanide by means of lead peroxide, a quantity of potassium hydrate is set free, which must be neutralized in some way before the reaction can go on to completion, and carbonic acid suffices for the neutralization. The author's process consists in adding calcium plumbate to a solution of potassium ferrocyanide, and passing a stream of carbonic acid gas, when the reaction proceeds according to the equation—



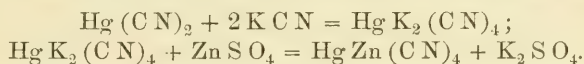
The carbonates of lead and calcium separate as an insoluble precipitate, which can be filtered off and regenerated by a simple roasting, whilst the solution contains potassium ferricyanide in a pure form, and potassium carbonate as a valuable by-product. The author considers that the intrinsic merits of potassium ferricyanide as an oxidizing agent *in alkaline solution* will occasion an extensive demand for it when its production has become sufficiently cheap.

The So-called Double Cyanide of Zinc and Mercury. A Chemical Study of the New Surgical Antiseptic. W. R. Dunstan. (*Pharm. Journ.*, 3rd series, xx. 653.) Sir Joseph Lister has recently drawn attention to the valuable antiseptic properties possessed by a material which is described in many chemical treatises as a double cyanide of zinc and mercury, prepared by precipitating a solution of the cyanide of mercury and potassium with a solution of zinc sulphate (*Lancet*, November 9, 1889, and January 4, 1890).

The author's investigation tends to prove that this preparation is not a chemical combination of the cyanides of zinc and mercury,

and also to dispose of the hypotheses that the substance contains a mercuric hydroxy-cyanide combined with zinc cyanide or a zinc hydroxy-cyanide united with mercuric cyanide. All his observations accord with the assumption that the mercuric cyanide is mechanically retained by the zinc cyanide.

The author gives the following process as the one best adapted for the preparation of this antiseptic:—Mercuric cyanide, finely powdered, is completely dissolved in a warm concentrated solution of potassium cyanide, and precipitated, when cold (12–15° C.), with a cold saturated solution of zinc sulphate. The ingredients should be used in the proportions indicated by the equations—

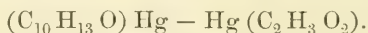


The potassium cyanide should contain at least 95 per cent. of KCN, but even then a small quantity of a zinc hydroxy-compound will be formed, but its presence to this small extent does not appear to be deleterious. The precipitate is washed free from mercuric salt with cold water and dried, preferably over caustic soda or on porous tiles. If the substance be dried at 100° C., from 2 to 3 per cent. of the mercuric cyanide will be rendered soluble in cold water. It is impossible to occlude the whole of the mercuric salt, because the presence of water during precipitation cannot be altogether avoided. If, with a view to economy, a smaller quantity of mercuric salt be employed in proportion to the zinc salt, mercuric cyanide is still dissolved, and a diminished quantity is found to be occluded. Under the most favourable circumstances about half of the mercuric cyanide is washed away, but the salt may of course be recovered by evaporating the washings. Mercuric sulphate cannot be advantageously substituted for mercuric cyanide, since, although it can be dissolved in aqueous potassium cyanide, more water is needed to keep the products in solution, and therefore less mercuric cyanide is occluded.

The Action of Hydrocyanic Acid on Calomel. M. Fouquet. (*Journ. de Pharm. et de Chim.*, November 1, 1889, 400.) The well-known reduction of calomel to metallic mercury has been considered by some investigators to be accompanied by the formation of mercuric chloride. The author finds that the reaction does not result in the formation of mercuric chloride, but that mercuric cyanide and hydrochloric acid are formed in equivalent proportions. This corroborates the results obtained long ago by Schoele, and more recently by T. H. Powell (see *Year Book of Pharmacy*,

1876, p. 372). The liberated hydrochloric acid, if not neutralized, prevents the completion of the reaction.

Double Salts of Mercury and Thymol. E. Merck. (*Pharm. Zeitung*, October 12, 1889, 625. From *Pharm. Journ.*) The process adopted by the author in the preparation of these salts is as follows:—A warm solution of mercuric nitrate, moderately acidulated with nitric acid, is poured in small quantities at a time, during stirring, into a warm alkaline solution of thymol, as long as the yellow precipitate that forms is redissolved. The liquor is then allowed to stand, and upon cooling forms a crystalline paste, consisting of felted needles of the double compound of mercuric thymolate and nitrate. This is purified by recrystallization from dilute soda solution, in which, when warm, it is freely soluble. Another way is to pour the warm, weakly acidulated solution of mercuric nitrate into an alcoholic solution of thymol, this mixture also upon cooling forming a paste of soft felted needles. The former plan has so far the disadvantage that the alkaline solution of thymol becomes slightly coloured, so that the product is not purely white, in addition to affording an opportunity for the formation of sodium nitrite, which requires considerable washing for its removal. The pure mercury-thymol double salt is said to be perfectly colourless and odourless, but it gradually becomes reddish, especially if exposed to daylight, and acquires a faint thymol odour. When mercuric nitrate and thymol are used, the salt formed is represented by the formula $(C_{10}H_{13}O)Hg - Hg(NO_3)$; but when mercuric acetate is used, the formula is given as



Combination of Cupric Oxide with Sugars. C. E. Guignet. (*Comptes Rendus*, cix. 528–530.) Ammonio-cupric oxide gives no precipitate with sugars, but a solution of cuprammonium sulphate, free from excess of ammonia, gives, with glucose, galactose, etc., an almost immediate precipitate soluble in excess of the reagent. Saccharose, lactose (and probably their isomerides), invert saccharose, and pure levulose from inulin, give no precipitate. If, however, glucose is added to invert sugar or to levulose, the glucose compound is precipitated after some hours, a result which seems to indicate that invert sugar is a compound and not a mere mixture of levulose and glucose.

Synthesis of Grape Sugar. E. Fischer. (*Ber. der deutsch. chem. Ges.*, xxiii. 799–805. From *Journ. Chem. Ind.*) The author con-

verts *d*-mannonic acid into gluconic acid by heating 20 parts of the former with 40 parts of quinoline and 5 parts of water for twenty minutes at 150° C., and then for forty minutes longer at 140° C. A solution of 40 parts of crystallized barium hydrate is added, and the quinoline removed by distillation with steam. To separate from the *d*-mannonic acid the barium is precipitated with the exact amount of sulphuric acid; the filtrate from barium sulphate is evaporated to about 150 c.c., and then boiled for half an hour with 60 grams of brucine, which will be entirely dissolved. After standing for some time at ordinary temperature, the excess of brucine separates out in crystals. The filtrate is evaporated until barium mannonate begins to crystallize, and then poured into 25 times its volume of absolute alcohol, in which barium mannonate is nearly insoluble. It begins at once to separate out. After filtration the alcoholic filtrate is again evaporated, the resulting syrup dissolved in water and decomposed with 20 grams of crystallized barium hydrate, when the brucine is partly precipitated and separated in crystals. To remove that part of the base which remained dissolved, the aqueous solution is again evaporated to a syrup, and then treated with hot alcohol. The brucine is dissolved, whilst the residue contains the barium compounds. This is redissolved in hot water, the barium carefully precipitated by sulphuric acid, and the filtrate from the barium sulphate, containing gluconic acid, treated with animal charcoal. For further purification the phenylhydrazide was prepared by heating the liquid, after concentration to 30 c.c., with three parts of phenylhydrazine and the corresponding quantity of acetic acid. It melts at 206° C. The calcium, barium, and cinchonine salts of the synthetic gluconic acid were prepared from the hydrazide, and proved to be identical with the salts obtained from the ordinary gluconic acid.

Conversion of Gluconic Acid into Glucose.—A solution of gluconic acid prepared from the pure calcium salt by precipitation with oxalic acid, is concentrated on the water-bath to a syrup, to convert the greatest possible amount of the acid into its lactone. It is then redissolved in 9 parts of water, the mixture cooled to 0° C., and a small quantity of sulphuric acid added to it. Sodium amalgam is added in small portions, and is very quickly consumed. It is necessary to add from time to time small quantities of sulphuric acid to keep the mixture acid. About 8 parts of the amalgam are required to 1 of the syrup. To isolate the sugar the solution is neutralized, evaporated until sodium sulphate begins to crystallize out, and poured into an abundant quantity of hot alcohol. Sodium

sulphate is precipitated. The alcohol contains, besides glucose, sodium salts of organic acids. On repeating this method of purification several times, pure glucose crystallizes from the alcohol after several additions of small quantities of ether. It has all the properties of ordinary glucose.

Action of Chloral on Glucose. A. Heffter. (*Ber. der deutsch. chem. Ges.*, xxii. 1050, 1051; *Journ. Chem. Soc.*, September, 1889.) Two compounds, having the composition $C_8H_{11}O_6Cl_3$, are formed when glucose is heated at 100° for one to two hours with chloral. The crude product is dissolved in hot alcohol, the solution diluted with a large quantity of hot water to precipitate resinous substances, the filtrate repeatedly evaporated to free it from alcohol and chloral, and the residue fractionally recrystallized from water.

One of the compounds is insoluble in cold water, and separates in thin, tasteless, wavy, anhydrous plates; it melts at 230° , and is readily soluble in hot alcohol, ether, and glacial acetic acid, but only sparingly in hot water.

The other compound is sparingly soluble in cold water, and crystallizes in colourless, anhydrous needles, melting at 186° ; it has a bitter taste, and is very readily soluble in alcohol, ether, and glacial acetic acid, but only moderately so in hot water.

Both compounds are dextrorotatory, and reduce Fehling's solution, but they do not reduce mercuric oxide. The more sparingly soluble compound has a distinctly poisonous action, and is not acted on by hot concentrated nitric acid. The more readily soluble compound has no poisonous properties, and is decomposed by concentrated nitric acid, yielding a yellowish oil. Both are oxidized by potassium permanganate in alkaline solution, yielding crystalline acids, containing 36.1 and 36.3 per cent. of chlorine respectively, both of which separate from water in colourless needles, and are very similar in properties; the acid from the more sparingly soluble compound melts at $200-201^\circ$, the other at 215° . They both reduce Fehling's solution, and the barium, calcium, copper, and silver salts of both are microcrystalline, and very sparingly soluble or insoluble in water.

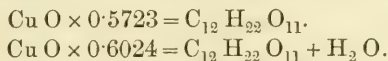
Cane-Sugar from Maize. J. H. Washburn and B. Tollens. (*Ber. der deutsch. chem. Ges.*, xxii. 1047, 1048.) The authors have succeeded in isolating crystalline cane sugar from ripe maize, and also, but in rather larger quantities, from ripe American sweet maize.

Rotatory and Reducing Power of Pure Lactose. E. W. T. Jones. (*Analyst*, xiv. 81-83.) The author has redetermined the

rotatory power of pure crystallized lactose. For a solution of 5 grams of the crystals, $C_{12}H_{22}O_{11} + H_2O$, in 100 c.c., prepared hot, and of sp. gr. 1018.6 at 15.5° , the values obtained are :—

For $C_{12}H_{22}O_{11} + H_2O$.	For $C_{12}H_{22}O_{11}$.
$[a]_j = 57.5^\circ$	60.5°
$[a]_D = 51.9$	54.6

The reducing power was determined by O'Sullivan's method, the cuprous oxide being converted into cupric oxide by careful ignition, and weighed. The results were as follows :—



The crystals of lactose do not lose their water by twenty-four hours' heating in a water-oven, but if dissolved in water and re-dried, the anhydrous sugar is obtained in a few hours. Heating with citric acid does not affect either the rotatory or the reducing power of lactose, whilst it causes the complete conversion of cane-sugar.

Lactic Acid in Molasses. K. Beythien, E. Parcus, and B. Tollens. (*Liebig's Annalen*, cclv. 228, 229.) The author has examined molasses from various sources and obtained by different processes, and found them all to contain lactic acid, amounting in some instances to as much as $\frac{1}{2}$ per cent.

Preparation of Gluconic Acid. A. Heffter. (*Ber. der deutsch. chem. Ges.*, xxii. 1049.) This acid can be prepared by decomposing the mercurous salt with sulphuretted hydrogen. Mercurous gluconate is obtained by boiling an aqueous solution of glucose with yellow mercuric oxide until the reduction is complete, and filtering the solution.

Quebrachite, a Sugar from Quebracho. C. Tanret. (*Comptes Rendus*, cix. 908-910.) The author obtained this sugar by mixing coarsely powdered quebracho bark (*Aspidosperma Quebracho*) with milk of lime, and extracting the same with alcohol of 50 per cent. The liquid was evaporated to half a litre for every kilo. of the bark used, neutralized with acetic acid, and treated with basic acetate of lead. The sugar was then precipitated from the filtrate with ammoniacal lead acetate, well washed, and decomposed with dilute sulphuric acid. The solution was evaporated to the consistence of a syrup, the residue dissolved in the smallest required portion of alcohol of 90 per cent.; and from this solution the sugar was precipitated with ether and further purified. Quebrachite

thus obtained has a specific gravity of 1.54 at $0^{\circ}\text{C}.$, and a composition corresponding to the formula $\text{C}_7\text{H}_{11}\text{O}_6$. It melts at 186 – $187^{\circ}\text{C}.$, boils in vacuo at $210^{\circ}\text{C}.$ subliming in needles, is lævogyre $\alpha_{\text{D}} = -80^{\circ}$, does not reduce Fehling's test, reduces ammoniacal silver nitrate on boiling, and does not undergo fermentation with yeast. Quebrachite heated with hydriodic acid yields a lævogyre inosite $\text{C}_6\text{H}_{12}\text{O}_6$, an aromatic compound, melting at $238^{\circ}\text{C}.$, boiling in vacuo at 250° .

A New Sugar of the Aromatic Series. L. Maquenne. (*Comptes Rendus*, cix. 812–814; *Journ. Soc. Chem. Ind.*, March, 1890.) There is an article known in commerce as "pinite," which is a sugar derived from *Pinus lambertiana*. In its ready solubility in water, its slight solubility in alcohol, and its crystalline form, it resembles the pinite of Berthelot. It is, however, more dextro-rotatory. It is proposed to call it β -pinite. Its formula lies between $\text{C}_7\text{H}_{14}\text{O}_6$ and $\text{C}_8\text{H}_{16}\text{O}_7$, and it closely resembles sennite, with which it may be identical. It is readily attacked by warm hydriodic acid. The product so produced, when purified by precipitation from alcohol, is very soluble in water, almost insoluble in alcohol, and quite insoluble in ether. Its melting point is $246^{\circ}\text{C}.$ It exactly corresponds in composition to the glucoses, and its molecular weight, as determined by Raoult's method, is 176 – 178° . It is an aromatic derivative, and is isomeric with inosite. The name β -inosite has been attached to it.

Sorbite. C. Vincent and M. Delachanal. (*Comptes Rendus*, cix. 676–679.) Sorbite occurs in all fruits of the order *Rosaceæ*, such as pears, apples, medlars, cherries, plums, prunes, peaches, and apricots. Some of these are particularly rich in sorbite. From pears the authors have extracted 8 grms. of sorbite per kilo., and from cherries and prunes 7 grms. per kilo.

Lignin. G. Lange. (*Zeitsch. Physiol. Chem.*, xiv. 15–30.) Lignin was prepared both from beech and ash wood, the method adopted being that of Thomsen. The lignin obtained after treatment with the usual solvents was finally fused with alkali, and the products were examined. They consisted of cellulose, lignic acid, formic acid, acetic acid, protocatechuic acid, catechol, ammonia, traces of higher bases, and a crystalline substance in very small quantities, which has yet to be investigated.

Arabinon, the Saccharon of Arabinose. C. O'Sullivan. (Abstract of a paper read before the Chemical Society, December 19, 1889. From the Society's Proceedings.) In a former communication, under the name of α -arabinose, the author has

described a substance obtained by hydrolysis of arabic acid, having an optical activity "well above $[\alpha]_D = 140$ "; this is more fully considered in the present communication. The details of its preparation from geddic acid, an acid obtained from Gedda gum—which the author will describe in a future notice—are fully given. As yet it has not been obtained in a crystalline state: when dried over sulphuric acid in vacuo, and then at a temperature gradually increasing to $75-80^\circ$, it is obtained as a glassy mass, which when pulverised forms a white hygroscopic powder. It has a specific rotatory power of $[\alpha]_D = 198.8^\circ$; and 100 parts have the same cupric reducing power as 58.8 parts of dextrose. It yields arabinose on hydrolysis, and appears to bear a similar relation to this carbohydrate that saccharon (cane sugar) bears to glucose: the author therefore terms it *arabinon*, preferring the vowel system of nomenclature to that proposed by Scheibler. Combustions were simultaneously made of saccharon and arabinon with the following results:—

	Saccharon.	Arabinon.	Theory for $C_{10}H_{18}O_9$
Carbon	42.11 . . .	42.46 . . .	42.58
Hydrogen	6.61 . . .	6.55 . . .	6.38

The molecular weight found by Raoult's method was 239.2; that of a carbohydrate of the formula $C_{10}H_{18}O_9$ is 282, and although the number obtained is low, bearing in mind the fact that this is the case with the "on" carbohydrates, and that the preparation may not have been free from ash constituents, there can be no doubt that the compound belongs to the "on" and not to the "in" or dextrin class. The amount of arabinose obtained on hydrolysing 100 parts of arabinon was 104.9; the theoretical yield, if $C_{10}H_{18}O_9 + H_2O = 2C_5H_{10}O_5$, is 106.3.

Sulphurous Acid as a Product of Alcoholic Fermentation. B. Haas. (*Amer. Journ. Pharm.*, March, 1890.) Sulphurous acid, as a product of alcoholic fermentation, was discovered in beer, and quite recently by the author in wines. It is not a constant product, but is formed by the reduction of sulphates present in the wort or must if the fermentation proceeds very slowly; if the fermentation is a quick one, no sulphurous acid is produced. The SO_2 can be estimated by distilling the liquors in a current of CO_2 , collecting the distillate in a solution of iodine, and precipitating the sulphate formed with barium chloride.

Purification of Alcohol for Laboratory Uses. E. Walter. (*Analyst*, March, 1890, from *Journ. Amer. Chem. Soc.*) A con-

venient amount of the alcohol to be purified is shaken with pulverised potassium permanganate until it assumes a decided colour. It is then allowed to stand for some hours, until the permanganate has been decomposed and brown manganese oxide is deposited. A pinch of pulverised calcium carbonate is then added, and the alcohol distilled at the rate of about 50 c.c. in twenty minutes from a flask, provided with a Wurz tube or one of the Lebel-Heninger pattern. The distillate is tested frequently until about 10 c.c. thereof, when boiled with 1 c.c. of strong (syrup) solution of caustic soda or potash, give no perceptible yellow coloration on standing for twenty minutes or half an hour. What distils over after that time is preserved for use.

The first distillates may be added to the small amount remaining in the distilling flask (which should not be driven down to complete dryness), and a fresh portion of purified alcohol recovered.

The *rationale* of the proceeding appears to be that the permanganate oxidizes and destroys chiefly the fusel-oil, furfurol, and other compounds of that nature, the acids resulting from the reaction are neutralized by the calcium carbonate added before distillation, and by distilling slowly the aldehyde, at least, is concentrated in the first portions of the distillate. Distillation of alcohol containing caustic potash or soda seemed to cause a constant formation of aldehyde. The alcohol thus purified is perfectly neutral, and gives most satisfactory results when used as a solvent for caustic alkalies or silver nitrate, the solutions remaining as colourless as distilled water, even after boiling and standing indefinitely, if properly protected from dust and other external influences.

An Investigation of the Conditions under which Hydrogen Peroxide is formed from Ether. W. R. Dunstan and T. S. Dymond. (Abstract of a paper read before the Chemical Society, May 1, 1890. From the Society's Proceedings.) The authors have investigated the conditions under which hydrogen peroxide is formed from ether. The ether used by them was purified by the usual method, and also by repeated agitation with dilute aqueous chromic acid.

Contrary to the usual statement, the authors find that pure ether, either wet or dry, does not form hydrogen peroxide when exposed to light (daylight or electric light).

Ether prepared from methylated spirit yields hydrogen peroxide when kept for some time, but not if it has been previously purified by means of dilute chromic acid.

Neither water nor dilute sulphuric acid forms hydrogen peroxide when exposed to light in contact with air.

Hydrogen peroxide is formed when ozone acts on ether in the presence of water.

Hydrogen peroxide is produced when certain conditions are maintained during the slow combustion of ether in contact with water. At a low red heat the ether and oxygen appear to interact in a manner similar to that in which ozone and ether interact.

Vinyl Alcohol, a Constant Impurity in Ethyl Ether. T. Poleck and K. Thümmel. (*Ber. der deutsch. chem. Ges.*, xxii. 2863-2880.) When a solution of mercury oxychloride in pure sodium or potassium carbonate is shaken for ten to twenty minutes with ether from the most varied sources, a yellowish white amorphous precipitate is always produced in small quantities, varying from 0.89-6.64 per cent. The samples employed had generally a neutral reaction, liberated iodine from a solution of potassium iodide, gave a brown coloration with potash, and were free from acetaldehyde; after having been shaken with the mercury solution, the ether gave no coloration with potash. The white precipitate has the composition $\text{CH}_2 : \text{CH} \cdot \text{O} \cdot \text{Hg} \cdot \text{O} \cdot \text{Hg}_2 \text{Cl}_2$, and may be named *vinyl oxymercurochloride*. When ether is distilled with phenylhydrazin, the distillate gives no coloration with potash, and no precipitate with the mercury solution; the residue contains ethylidene phenylhydrazin.

The author has satisfied himself that the substance, which is present in ether and is precipitated by the mercury solution, is *vinyl alcohol*.

Commercial ether gives only a slight blue coloration with dilute chromic acid solution, but on agitating with air an intense blue coloration is produced, owing to the formation of hydrogen peroxide.

Review of Recent Work on Spirit of Nitrous Ether and Ethyl Nitrite. T. S. Dymond. (*Pharm. Journ.*, 3rd series, xx. 755.) The main part of this paper is devoted to a critical examination of a paper by R. E. Squibb, published in *Ephemeris*, vol. iii., No. 4, and more particularly of that portion of the latter in which that author comments unfavourably on the proposed replacement of spirit of nitrous ether by a pure solution of ethyl nitrite. The author of the present paper expresses himself decidedly in favour of that replacement, and bases his preference for the solution of ethyl nitrite (as proposed by W. R. Dunstan and himself) on the following grounds:—It is easily prepared, its active constituent

does not decompose, it has a definite and constant composition, the ethyl nitrite does not escape from it readily, and it possesses the full therapeutic value of spirit of nitrous ether as far as present evidence has shown.

For further particulars the original paper should be consulted.

Action of Borax on Polyhydric Alcohols. L. Lambert. (*Comptes Rendus*, cviii. 1016 and 1017.) The author confirms Klein's statement that when mannitol, glycerol, erythrol, dextrose, levulose, or galactose, is mixed with a small quantity of boric acid or borax, the solution is strongly acid, and decomposes carbonates. He shows that this action is shared by arabite, arabinose, dulcitol and sorbite, and also by pyrogallol, catechol, and alkaline tannates and gallates. Polyglucosides, quercitol, and inosite, as well as orcinol, quinol, and resorcinol, are found to have no such action.

Decomposed Chloroform. A. C. Stark. (*Pharm. Journ.*, 3rd series, xx. 407.) The sample of decomposed chloroform reported upon in this paper had been kept exposed to diffused light and to a temperature ranging from 40° to 105° F. It was the product of well-known makers, and though made from methylated spirit, it answered all the requirements as to purity of the British Pharmacopœia while it was fresh. The products of decomposition were found to contain hydrochloric acid, chlorocarbonic acid (COCl_2), and phosgene gas. As the sample contained a small proportion of alcohol, the presence of which, according to M. H. Marty, (*L'Union Pharmaceutique*, November, 1888), affords an efficient protection against decomposition by light, the author regards the changes in this instance as attributable to the temperature to which the sample was exposed.

Preparation of Iodoform. J. Casthélaz and M. Bruère. (*Chem. Centralhalle*, 1890, i. 19.) The authors have worked with the method of manufacture of iodoform recently recommended by Suilliot and Raynaud (see *Year-Book of Pharmacy*, 1889, p. 35), and have obtained an almost theoretical yield. The product is completely soluble in alcohol, ether, chloroform, and carbon bisulphide, and has only a faint ethereal odour.

Concentration of Formic Acid. L. Maquenne. (*Bull. de la Soc. Chim.*, 1. 662-664.) When commercial formic acid containing 45-50 per cent. of water is treated with an equal weight of sulphuric acid, and distilled under reduced pressure at 66°, a distillate containing 84-85 per cent. of real formic acid is obtained, and this distillate, when distilled under reduced pressure at 65°,

with one-half its weight of sulphuric acid, will yield a solution containing 98 per cent. of real formic acid. The loss is small.

Action of Lead Peroxide on Glycerin. M. Gläser and T. Morawski. (*Monatshefte*, x. 578-584.) When a mixture of 2 parts of glycerin, 5 to 10 parts of sodium hydrate, and 25 parts of lead peroxide is gently heated in the presence of 100 c.c. of water, a vigorous evolution of hydrogen occurs, sodium or potassium formate being simultaneously formed, according to the equation, $C_3H_8O_3 + 3O = H_2 + 3H\cdot C\ O\ O\ H$. About 97 per cent. of the theoretical quantity of formic acid is produced.

Linoleic Acid. A. Reformatsky. (*Journ. Russ. Chem. Soc.*, xxi. 202-226.) The author's investigation shows that the formula of this acid is not $C_{16}H_{28}O_2$, as hitherto assumed, but that it consists principally of the compound, $C_{18}H_{32}O_2$. The pure acid can be obtained from the ethyl salt by saponification and subsequent decomposition of the alkali salt with dilute sulphuric acid.

Myristic Acid. C. Hell and S. Twerdomedoff. (*Ber. der deutsch. chem. Ges.*, xxii. 1745-1748.) This paper deals with the following derivatives:—*Bromomyristic acid*, *hydroxymyristic acid*, *amidomyristic acid*, and *anilidomyristic acid*. For particulars reference should be made to the original paper.

Oxidation of Ricinoleic Acid. V. Dieff. (*Journ. prakt. Chem.*, xxxix. 339.) A mixture of two isomeric trihydroxystearic acids was obtained by the oxidation of ricinoleic acid with alkaline potassium permanganate.

Stability of Fatty Oils. T. T. P. B. Warren. (*Chemical News*, lx. 42.) It is known that the drying or clogging properties of oils are due to their becoming oxidized. Poppy seed and walnut oils thicken readily on exposure to warm air, cotton and rape seed oils suffer a similar change when heated air or oxygen is passed through them; olive oil, however, does not thicken under the same circumstances, and is, in fact, more stable than sesame oil.

When these oils oxidize, their iodine absorption diminishes. It is therefore practicable to decide as to the suitability of an oil for lubricating purposes by simply noting its iodine absorption before and after submitting it to the action of oxygen.

Composition of Animal and Vegetable Fats. R. Benedikt and K. Hazura. (*Monatshefte*, x. 353-356.) Hazura and others have shown that all vegetable oils seem to contain linoleic acid. The authors have now examined palm oil and also cacao butter, and find lineolic acid in both, whilst oleic acid alone could be obtained from the numerous solid and liquid fats and oils of animal

origin which they and others have previously examined. Lard and tallow also gave the same result. The authors believe this will enable the analyst to decide whether commercial oleic acid or "elain"—the liquid acid obtained in soap-making—is of vegetable or animal origin. If of vegetable origin, it will yield sativic acid on oxidation by potassium permanganate; if of animal origin, dihydroxystearic acid will be formed.

Sunflower Oil. K. Hazura. (*Monatshefte*, x, 190–195.) The author shows that the iodine number of pure sunflower oil is 134.5, and the saponification number 191.6. The liquid fatty acids contained in it are found to consist almost entirely of linoleic acid with a small quantity of oleic acid.

Sunflower Oil. C. B. McKeel. (*Amer. Journ. Pharm.*, March, 1890.) The author extracted a quantity of the fixed oil from sunflower fruit. This oil when pure is almost free from odour and is said to be used for culinary purposes. The oil was found to exist in the fruit to the extent of 27.06 per cent., and was obtained by extraction with petroleum ether. On the large scale a gallon of oil is obtained from a bushel of the seeds. As ordinarily extracted, the oil has a light yellow colour and a slight nut-like odour and taste. It is soluble in ether and chloroform, but insoluble in alcohol, and is easily saponified; but it is non-drying on exposure to air.

Asarum Oil. J. F. Eykman. (*Ber. der deutsch. chem. Ges.*, xxii, 3172–3176.) This oil contains a crystalline constituent, *asarone*, the vapour density of which is 102.9. The liquid constituent of the oil is regarded by the author as probably a methyl ether of isoeugenol.

The Oxidation of Turpentine in Sunlight. H. E. Armstrong (Abstract of a paper read before the Chemical Society, June 5, 1890. From the Society's Proceedings.) It was pointed out by Sobrero, in 1851, that when turpentine is exposed to light in presence of moisture and oxygen a crystalline substance is formed which has the composition represented by the formula $C_{10}H_{18}O_2$; and that this substance is decomposed when boiled with dilute sulphuric acid, an oil being formed which has a powerful odour, recalling both that of camphor and that of turpentine. The author's attention became directed to this substance about twelve years ago, in the course of his studies of the terpenes and camphor, and in most years since, during the summer, he has carried on experiments on the oxidation of $C_{10}H_{16}$ hydrocarbons in sunlight, and has been able to confirm Sobrero's statements in every par-

ticular. As the crystalline product in question has not yet been named, it is proposed to term it—at all events provisionally and until its constitution is determined—*sobrerol*. A description of the properties of this substance will be found in the original article.

Essential Oils and Terpenes. O. Wallach. (*Liebig's Annalen*, cclii. 94–105.) The author has re-examined the oil obtained from the leaves and from the berries of the laurel, and finds that it consists of a mixture of cineole and pinene. Olibene from frankincense is identical with *lævo*-pinene. Elemi oil contains dextro-phellandrene, dipentene, and a crystalline compound which is probably Vesterberg's amyryn. The lower boiling fraction of oil of sage contains pinene and cineole, but the chief portion, boiling between 201 and 204°, consists of *salviol*. The portion of mace oil boiling about 165° consists of a mixture of dextro- and *lævo*-pinene. The higher boiling fractions contain dipentene and a dextro-rotatory compound which has not yet been investigated.

Constituents of Eucalyptus Oil. Schimmel and Co. (*Zeitschr. für analyt. Chem.*, xxix. 222, 223.) Eucalyptus oil now in the market contains 50 per cent. of eucalyptol, together with phellandrene. To recognise the latter constituent, it is advised to mix 1 c.c. of the oil with 2 c.c. of glacial acetic acid, and to then add 1–2 c.c. of a strong aqueous solution of sodium nitrite. On gently agitating, the separated oil almost immediately solidifies to a crystalline mass of phellandrene nitrite.

The highest boiling portions of eucalyptus oil (portions boiling from 220–260° C.) contain cuminol. To identify the pure compound, obtained from the sodium bisulphite compound, oxidation was performed by means of permanganate; the acid thus obtained possessed the melting point of cuminic acid.

Good oil should contain from 50–70 per cent. of eucalyptol; the best kinds are so rich in eucalyptol that they may be semi-solidified by a freezing mixture.

Essential Oil of Carrot. M. Landsberg. (*Archiv der Pharm.*, 1890, ccxxviii. 85.) The oil, obtained by means of high pressure steam from the fruit of *Daucus Carota*, is yellow, of a pleasant carrot odour and pungent taste, acid to litmus paper and easily soluble in alcohol, ether, glacial acetic acid, chloroform, etc.; sp. gr. at 20° C. 0.8829. The chemical constituents are (1) a terpene, boiling at 159–161° C., and belonging to the pinene group (Wallach), and (2) an oxygenated portion, $C_{10}H_{18}O$, closely allied to cineol, and can be regarded as a monohydrated terpene. Acetic acid was noticed in small quantity.

Apiole. G. Ciamician and P. Silber. (*Ber. der deutsch. chem. Ges.*, xxii. 2481-2490.) The authors give the name *apionole* to the tetrahydroxybenzene which forms the basis of apiole. The dimethyl ether of tetrahydroxybenzene is, therefore, dimethyl-apionole, and "apione" is dimethylmethylenepionole.

Oxidation of Safrole. T. Poleck. (*Ber. der deutsch. chem. Ges.*, 1889, 2861.) The author finds that safrole when oxidized by potassium permanganate yields piperonal and piperonylic, carbonic, formic, acetic, and oxalic acids; but no propionic acid, as was stated by Schiff in 1884.

Action of Carbon Bisulphide on Menthol and Borneol. E. Bamberger and W. Lodter. (*Ber. der deutsch. chem. Ges.*, xxiii. 213-215.) The authors have studied the action of carbon bisulphide on menthol and borneol, and have obtained results showing that these alcohols form xanthic acids.

Menthylxanthic acid and *bornylxanthic acid* are described in the paper.

Mesocamphoric Acid. C. Friedel. (*Comptes Rendus*, cxviii. 978-984.) Mesocamphoric acid is an isomeride of camphoric acid, obtained, according to Wreden, by heating camphoric acid with hydriodic or hydrochloric acid.

The results of the author's investigation lead to the conclusion that mesocamphoric acid belongs to the same group as racemic acid.

Camphamines: New Bases derived from Camphor. P. Cazeneuve. (*Bull. de la Soc. Chim.* [3], ii. 715-717; *Journ. Chem. Soc.*, May, 1890.) On heating α -chlorocamphor (5 grams) with saturated aqueous ammonia (20 grams) in sealed tubes at 180° for twenty-four hours, a black mass is formed. This is dissolved in acetic acid at 100° , and to the solution, after precipitation and filtration of the unaltered chlorocamphor by addition of water, an excess of potassium carbonate is added, and the precipitated base is extracted with ether.

The base is removed from its solution in ether by agitation with water acidified with hydrochloric acid, and is precipitated by aqueous ammonia, and after washing dried in a vacuum. The yield is about 2 per cent.

This camphamine, $C_{10}H_{15}O \cdot NH_2$, crystallizes from light petroleum in radiating groups of needles, melts at 180° , and has the odour of old tobacco. It is insoluble in water, but is soluble in alcohol, ether, and chloroform, and also in weak acids, from which its corresponding salts crystallize. The hydrochloride forms long

colourless needles. Unlike the base obtained from camphor by Schiff, this does not reduce Fehling's solution, and is unattacked by acetic chloride.

From the chlorocamphor obtained by acting on camphor with hypochlorous acid, an isomeric base may be obtained in like manner. This is not crystalline, and is unstable.

Both these bases are precipitated by the ordinary reagents for alkaloids.

Naphthol-Camphor and Salol-Camphor. M. Désesquelle. (*Répertoire*, May 10, 1890, 200.) The valuable antiseptic properties of these two compounds are confirmed by the author, who also reports that they possess considerable solvent powers as regards iodine, cocaine hydrochlorate, and the cinchona alkaloids. They are miscible with fatty and volatile oils, and soluble in ether and alcohol, but insoluble in water. In order to prepare them, 200 parts of camphor are reduced to a fine powder, together with 100 parts of β -naphthol or 300 parts of salol, and then gently warmed until the mixture is completely liquefied. The liquid is then filtered and preserved in a bottle with a well-fitting stopper.

Solubility of Salol. M. Lacroix. (*Journ. de Pharm. et de Chim.*, xx. 576.) The author finds that salol is freely soluble in fatty oils, volatile oils, oleo-resins, and vaseline. Availing himself of this solubility, he suggests the preparation of gelatin capsules containing salol associated with copaiba, turpentine, etc.

Impurities in Commercial Salicylic Acid. B. Fischer. (*Pharm. Zeitung*, 1889, 329. From *Journ. Chem. Soc.*) Salicylic acid contains cresotic acid when manufactured from impure phenol containing cresol. The presence of potash in the sodium hydrate employed occasions the formation of parahydroxybenzoic acid; this acid is also produced if the temperature is too low at the time when the current of carbonic anhydride is passed, whilst too high a temperature at this stage results in the production of hydroxyisophthalic acid, due to the action of the gas on the sodium salicylate already formed. Lastly, particularly in presence of iron salts, brown or yellow compounds are formed by oxidation, which are insoluble in water, and give a yellow colour to the salicylic acid. In a well-conducted process, parahydroxybenzoic and hydroxyisophthalic acids are usually not formed in quantities exceeding 0.4 per cent., and the first is easily removed by washing, as it is readily soluble in water. The second acid is less soluble in water, and may amount to 1 per cent. in certain cases. Cresotic acid is the most important impurity, as apart from its

obscure physiological action, its presence is very objectionable. The amount of cresotic acid present may be estimated by titrating with decinormal baryta solution, using phenolphthalein as indicator. Owing to the difference in their molecular weights, less solution is required to saturate cresotic acid than is required by salicylic acid, but great care is needed to obtain satisfactory results, and certain accidental impurities should be previously sought for; namely, water, colouring matters, and sodium chloride. With this view, dissolve in ether; if the solution is not clear, filter, evaporate, and dry first at 60° , then in a vacuum over sulphuric acid. In the absence of these impurities, it is necessary to dry the sample. The baryta solution is standardized by the use of pure salicylic acid obtained by converting the commercial acid into the calcium salt, recrystallizing, and then decomposing the salt by means of hydrochloric acid. For the detection of cresotic acid, 15 c.c. of water and 1 to 2 grams of calcium carbonate are boiled in a 200 c.c. flask; 3 grams of the salicylic acid are added, and the flask is agitated over a flame until the volume is reduced to about 5 c.c. By this time some crystals have formed. After cooling, the mother-liquor is transferred to a test tube and evaporated to 1 c.c. On rubbing this with a glass rod, crystallization sets in. 1 c.c. of water is added, and the liquid filtered through a small plug of cotton. The filtrate is made up to 1 c.c. and hydrochloric acid is added; if the original acid contained 3 to 5 per cent. of cresotic acid, there separates out a mixture of acids which fuses in boiling water and collects at the bottom of the test tube in the form of thick, oily drops. The test does not succeed with less than 1 per cent. Hydroxyisophthalic acid may be separated from salicylic acid by distillation in a current of steam. The first acid remains in the still as a light-grey powder or as small lumps. By dissolving it in sufficient hydrochloric acid and filtering through charcoal, it can be obtained in the form of slender, white needles, which fuse with decomposition about $300-305^{\circ}$. The author has found in one sample of commercial salicylic acid 0.5 per cent. hydroxyisophthalic acid, and in another 5.5 per cent. of cresotic acid.

Synthetically Prepared Carbolic Acid. (*Pharm. Centralhalle*, 1889, 535; and 1890, 68.) Synthetical carbolic acid melts at $41-42^{\circ}$ C., and boils at $178-181^{\circ}$ C. It is colourless, forms with water an absolutely clear solution, and differs most notably from the coal-tar acid by the purity and faintness of its odour.

A. Schneider has compared the ordinary and the synthetical

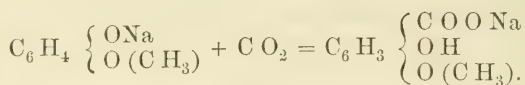
carbolic acid with regard to the action of different substances probably causing the red coloration. Samples of the two acids were allowed to stand for three months in contact with cork, wood, zinc, tin, iron and lead; the synthetic acid turned slightly yellow, while the coal-tar carbolic acid assumed a more reddish yellow colour. Samples of synthetic acid which were in contact with copper assumed a bright-red colour in a few days, which remained constant during the time of experiment. The acid from coal-tar, similarly treated, also turned red, and soon became a brown-coloured liquid. In a mixture with ammonia and alcohol, the synthetic acid assumes the same blue colour as the coal-tar acid although slower.

Iodized Phenols: Annidalin. M. Messinger and G. Vortmann. (*Ber. der deutsch. chem. Ges.*, xxii. 2312; *Pharm. Journ.*, 3rd series, xx. 241.) Upon adding solution of iodine in potassium iodide to an alkaline solution of phenol, in the proportions of eight atoms of iodine to one molecule of phenol and four molecules of potassium hydrate, and heating the mixture to 50 or 60° C., a dark-red non-crystalline precipitate falls, which has the composition of diodphenoliodide ($C_6H_3I_2 \cdot OI$), and is apparently isomeric with the already known white triodphenol, into which it is easily converted by boiling in potash solution and reprecipitation from solution by an acid. When dry, the new compound is violet coloured, odourless, insoluble in water and dilute acids, soluble in alcohol with a red colour, and freely soluble in benzol and chloroform. The cresols form analogous compounds. Thymol combines in the proportion of three atoms of iodine to two molecules of thymol, the product being probably a dithymol compound. When properly prepared, it is red, and will retain this colour several months if kept dry and protected from light; but in contact with moisture it is readily decomposed, giving off iodine and passing into a pale yellow compound containing only two atoms of iodine to the double molecule of thymol. This red compound is intended to be introduced into medicine as a substitute for iodoform, under the name "annidalin." It is described as being amorphous, insoluble in water, slightly soluble in alcohol, and freely soluble in ether and chloroform.

Aristol. Dr. Eichhoff. (*Apotheker Zeitung*, 1890, 46.) A compound similar to "annidalin" (see preceding abstract) is reported upon by the author under the name "aristol." This body is obtained as a reddish-brown amorphous precipitate when an aqueous solution of iodine in potassium iodide is treated with

thymol in solution of sodium hydrate. It is insoluble in water, slightly soluble in alcohol, and freely so in ether. It is represented as dithymol, in which two atoms of hydrogen are replaced by an equivalent proportion of iodine, the proportion of the latter amounting to 45·8 per cent.

Guaiacol-Carboxylic Acid. (*Pharm. Journ.*, 3rd series, xx. 977.) This compound, which is credited with extraordinary antiseptic and antipyretic properties, is obtained by a patented process, which consists in saturating guaiacol sodium with carbonic dioxide under pressure in the cold, and then heating the mixture, still in the closed vessels, to 100° C. The reaction is represented as taking place as follows:—



The product is dissolved in water and decomposed with a mineral acid, when the guaiacol-carboxylic acid crystallizes out in combination with two molecules of water. It melts in the anhydrous condition at 148–150° C., gives in solution with ferric chloride a blue colour, and upon being sufficiently heated is decomposed into carbonic dioxide and guaiacol.

Sozoiodol Salts. H. Trommsdorff. (*Pharm. Journ.*, 3rd series, xx. 1039.) As the potassium, sodium, lithium, zinc, and mercury compounds with di-iodoparaphenolsulphonic acid have been now adopted to some extent in medical practice, under the name of “sozoiodol salts,” the author supplies the following information as to their physical and chemical properties:—

GENERAL REACTIONS.

1. *Potassium Chlorate and Hydrochloric Acid.*—It is characteristic of all the sozoiodol salts, that upon warming them in aqueous solution, with potassium chlorate and hydrochloric acid, chloranil (tetrachlorquinone) is formed, which separates in shining gold plates. As the odour of chloranil is very intense and definite, this reaction allows of the detection of sozoiodol even when very much diluted. But since phenol and phenolsulphonic acid behave similarly, it is necessary also to test for iodine, which can be done by the following reaction:—

2. *Nitric Acid (1:4).*—All sozoiodol salts, upon being warmed with nitric acid, yield picric acid, which separates in yellow scales, and at the same time iodine vapour is evolved. The nitric acid

should be in considerable excess, and the heating continued until all the iodine is driven off.

3. *Sulphuric Acid*.—Upon heating the dry salt with concentrated sulphuric acid, iodine is immediately volatilized, and there is at the same time a formation of iodophenol, recognisable at once by its extremely disagreeable odour.

4. *Ferric Chloride Solution*.—All soluble soziodol salts produce, with a few drops of this solution, an intense blue-violet colour, which after a time passes to red-violet.

5. *Bromine Water*.—When bromine water is added to a soluble soziodol salt, iodine is set free, and can be shaken out of the solution by means of carbon bisulphide.

6. *Barium Chloride Solution* (1:20).—All soluble soziodol salts give with this solution a strong white precipitate, which after a time changes into needles and consists of the barium salt. It dissolves upon addition of ammonia, even in the cold, and also in much hot water.

7. *Silver Nitrate Solution* (1:20) produces with the soluble soziodol salts a white microcrystalline precipitate of silver soziodol, which is also easily soluble in excess of ammonia.

8. All soziodol salts upon being heated give off the red-violet vapour of iodine, sometimes with and sometimes without puffing up.

CHARACTERS AND TESTS OF THE SALTS.

The Potassium Salt occurs in commerce as a fine white crystalline powder, which upon being heated on platinum foil puffs up in an extraordinary manner (resembling almost the so-called Pharaoh's serpents); at the same time the very disagreeable odour of iodophenol is given off. If a portion be completely incinerated, the ash dissolved in water, and first hydrochloric acid and afterwards platinic chloride added, the well-known yellow precipitate of potassium platinochloride is formed. Potassium-soziodol is insoluble in alcohol, but 0.5 gram finely powdered dissolves in 50 c.c. of water at 15° C. by simply shaking it round. Twenty c.c. of this solution treated with two drops of silver solution give a white precipitate which should dissolve in dilute nitric acid (concentrated acid liberates some iodine). Not more than a quite faint opalescence should remain (traces of chlorine). If there should be a yellowish-white turbidity, it would indicate that the preparation contained free iodine.

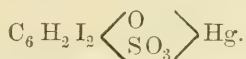
This may be the case when the contents of a bottle through frequent opening have been allowed to get damp, to which special attention is called. If a few drops of barium chloride solution (1:20) be added to the above-mentioned potassium-sozoiodol solution, the resulting white precipitate should dissolve completely, without turbidity, upon warming in water. A few drops of dilute sulphuric acid added to 10 c.c. of the above solution should give no turbidity (barium). Ammonium sulphide solution and sulphuretted hydrogen water should not render turbid a solution of 0.5 gram of the salt in 50 c.c. of water. Bromine water shaken with a solution of 0.5 gram of the salt in 50 c.c. of water should not cause turbidity, but only colour it yellow (a milky turbidity would indicate phenol, by the formation of tribromo-phenol).

The Sodium Salt comes into commerce in white prismatic needles, with a taste at first astringent and afterwards sweetish. One gram dissolves easily in twenty c.c. of cold water, but even in lukewarm water the solubility is essentially increased. In warm glycerin the solubility is almost the same. In hot alcohol, especially aqueous alcohol (80 per cent.), it is soluble up to 5 per cent. When heated upon platinum foil it, does not puff up; and the residual white fused mass gives a yellow flame when heated on a loop of platinum wire. Towards silver solution, barium chloride, dilute sulphuric acid, sulphuretted hydrogen, ammonium sulphide, and bromine water, it behaves exactly like the potassium compound.

The Lithium Salt appears in shining white plates, which sometimes assume a faint yellowish tinge without affecting its purity. It dissolves easily in water and weak alcohol. The incinerated salt heated on platinum wire gives a carmine red flame. Towards silver solution, barium chloride, and dilute sulphuric acid it behaves like the potassium salt.

The Zinc Salt crystallizes exactly like the sodium salt, in long white needles, which sometimes, when kept for a long time, assume a very faint reddish tinge. It does not puff up when heated, but leaves a yellow powder. It dissolves in alcohol much more easily than in water. The solubility of the finely powdered salt in cold water is 1:50; warm water dissolves it abundantly, about 5:100 remaining in solution after cooling. One gram of the salt dissolves easily in 10 grams of alcohol at an ordinary temperature. Toward silver solution, barium chloride, dilute sulphuric acid, and bromine water, it behaves like the potassium salt. With ammonium sulphide it gives a yellowish-white precipitate.

The *Mercury Salt* appears in commerce as a deep citron-yellow extremely fine and light powder. It is said to be sent out containing a constant proportion of 32 per cent. of mercury, corresponding to the formula—



Upon being heated, it puffs up like the potassium salt, and volatilizes rapidly without leaving any residue. In water and in alcohol it is practically insoluble. On the other hand, 0.5 gram of the salt should dissolve easily when shaken with 30 c.c. of a five per cent. solution of sodium chloride; the solution should contain no white or yellowish-white precipitate, or at most there should only be a faint milky turbidity. If 0.5 gram of the salt be dissolved in 50 c.c. of water with the aid of a little nitric acid, two drops of silver solution added to 10 c.c. of this solution should show only a mere trace of opalescence (chlorine.) The solution should not be rendered turbid by two or three drops of barium chloride solution, or by dilute sulphuric acid. With ammonia, a solution of the salt in sodium chloride gives a yellowish-white precipitate passing into grey, and with sulphuretted hydrogen a black precipitate. The quantitative determination of the mercury may be effected by dissolving 2 grams of the compound in 5 per cent. sodium chloride solution, adding one or two drops of hydrochloric acid, and precipitating with sulphuretted hydrogen; the sulphide is then dried at 100° C. upon a weighed filter.

Commercial Saccharin. I. Remsen and W. M. Burton. (*Amer. Chem. Journ.*, xi. 403–408.) The authors find that commercial saccharin is a mixture of benzoic sulphinide, parasulphaminebenzoic acid, and hydrogen potassium orthosulphobenzoate, the amount of the actual sweetening agent (benzoic sulphinide) present being somewhat less than 50 per cent. In two samples examined the last-named constituent amounted to 7.12 to 7.99 per cent., the parasulphaminebenzoic acid to 54.5 to 50.0 per cent., and the benzoic sulphinide to 42.86 to 48.33 per cent. Commercial saccharin may be analysed as follows:—2 grams of the sample are boiled for one hour with 100 c.c. of dilute hydrochloric acid (1–8) in a flask of 250 c.c. capacity, provided with a reflux condenser. The clear solution is then evaporated to about 15 c.c., when the parasulphaminebenzoic acid separates out; it is dried at 80°, and weighed. The filtrate, containing hydrogen ammonium

orthosulphobenzoate (from the decomposition of the sulphinide) and the hydrogen potassium salt of the same acid, is evaporated; the residue is weighed, and the amount of potassium in it is estimated by heating a portion with sulphuric acid, and weighing the potassium sulphate formed.

Sulphaminol, a New Antiseptic. E. Merck. (*Pharm. Centralhalle*, April 24, 1890, 243.) This new antiseptic is thio-oxydiphenylamine, obtained by the action of sulphur upon aqueous solutions of salts of m- oxydiphenylamine. It is a pale yellow, odourless, and tasteless powder, insoluble in water, but soluble in alcohol, glacial acetic acid, and alkalis. When administered medicinally, it undergoes decomposition and produces the action of phenol and sulphur. It possesses marked antiseptic properties, and is stated to be comparatively non-poisonous.

Antipyrine Salicylate. P. Spica. (*Pharm. Journ.*, 3rd series, xx. 1058.) The author reports that he has succeeded in preparing a well-crystallized compound, which he considers to be a salicylate of antipyrine, and thinks may turn out to possess therapeutic value. It is said to be obtained by adding to a boiling very dilute aqueous solution of antipyrine, in small portions at a time, a molecular proportion of salicylic acid (100 of antipyrine to 73.4 of salicylic acid). The salt occurs in fine, white, crystalline scales, or in flocks formed of very much elongated crystals, the scales tending to group round a centre. They are very slightly soluble in cold water (1 in 250), more soluble in hot water, and freely soluble in alcohol, ether, chloroform, and carbon bisulphide. The solutions manifest a faintly acid reaction, and have a taste sweet at first and then bitter. The crystals melt at 89–90° C., above which temperature they decompose. Left at ordinary temperatures in a vacuum space, they do not sensibly diminish in weight; and on analysis give results corresponding with the formula $C_{11}H_{12}N_2O \cdot C_7H_6O_3$.

Referring to the alleged incompatibility of antipyrine and salicylate of soda, the author reports (*L'Orosi*, May, 1890, 145), that the phenomenon of the passage into the liquid state of a mixture of antipyrine and sodium salicylate does not depend upon the formation of a salicylate of antipyrine, or the production of free alkali, but simply upon the absorption of moisture from the surrounding atmosphere. The oily liquid formed was ascertained to be perfectly neutral.

Antipyrine Salicylate. Dr. Scholvien. (*Pharm. Journ.*, 3rd series, xx. 1059.) The author states that a simpler way of prepar-

ing the compound than that given by Spica (preceding abstract) is to heat together antipyrine and salicylic acid in molecular proportions, with or without a little water, on a vapour bath. The mixture melts to an oil, which upon cooling solidifies, the crystalline cake being afterwards recrystallized from alcohol. Another method is to shake vigorously together an aqueous solution of antipyrine and an ether solution of salicylic acid, when the compound, which is almost insoluble in water and only soluble with difficulty in ether, separates slowly in handsome crystals.

Behaviour of Antipyrine towards Iodine. M. Manseau. (*Bull. Soc. Pharm. Bord.*, 1889, 148.) If decinormal solution of iodine be slowly added to solution of antipyrine, the precipitate formed disappears on stirring, and does not become permanent until a certain proportion of the iodine solution has been used. One gram of antipyrine is thus found to consume 6.8 c.c. of the decinormal solution. Practically the same proportion is consumed by analgésine under the same conditions. This reaction may therefore be applied with advantage for ascertaining the quality of these two substances. It is also stated to afford a delicate test for the detection of antipyrine in urine.

Solubility of Caffeine with Antipyrine. M. Crinon. (*Amer. Journ. Pharm.*, April, 1890.) The author reports, as a result of recent experiments made by him, that by adding to caffeine an amount of antipyrine slightly in excess of its weight, it becomes perfectly soluble in water without the aid of heat. With heat, he dissolved 50 cgm. of caffeine in 10 gm. of distilled water after adding 75 cgm. of antipyrine, and the solution remained limpid. The author adds that if the caffeine be prescribed for neuralgia or hemicrania, the antipyrine associated with it will aid in producing the desired effect.

Quinine and Antipyrine. M. Greuel. (*Apoth. Zeitung*, 1889 1365.) The author again draws attention to the fact that quinine is rendered more soluble by the addition of antipyrine. He states further that such a solution does not give the thalleioquin reaction, but yields a flesh-coloured precipitate, which crystallizes from alcohol in needles. This indicates that a chemical reaction has taken place between the two compounds, but the product has not as yet been studied.

Quinine Arsenate. MM. Champigny and Choay. (*Journ. de Pharm. et de Chim.*, August 1, 99; *Pharm. Journ.*, 3rd series, xx. 162.) The authors' examination of six samples of this preparation, obtained from different sources, showed that the quinine

varied from 58 to 74 per cent., the arsenic acid from 21·8 to 35·7 per cent., and the water from 2·5 to 9·9 per cent. Experiments were therefore made with salts prepared in different ways, and containing one or two molecules of quinine to the molecule of arsenic acid, as to which was most suitable for its stability and in other respects, and preference is given to a salt represented by the formula $C_{20}H_{24}N_2O_2 \cdot AsH_3O_4 \cdot 2H_2O$. It contains 66 per cent. of quinine, and is obtained in silky needles by dissolving equivalent quantities of quinine hydrochlorate and monopotassic arsenate in hot water, mixing the solutions and boiling, and after cooling, filtering, washing, and drying the precipitate, and recrystallizing from dilute alcohol. If instead of monopotassic arsenate the official disodic arsenate be used, a fairly stable salt is obtained, which is represented by the formula $3C_{20}H_{24}N_2O_2 \cdot 2AsH_3O_4 \cdot 24H_2O$, which also contains 66 per cent. of quinine.

Constitution of the Cinchona Alkaloids. Z. H. Skraup and J. Würl. (*Monatshefte*, x. 220-230; *Journ. Chem. Soc.*, November, 1889.) It has been previously shown that quinidine, on oxidation, yields cincholeuponic acid and quinine acid; the authors have now succeeded in isolating pure cincholeupone hydrochloride from the crude oxidation-product, and find it to be identical in every respect with the corresponding compound obtained from quinine and cinchonidine.

Cincholeupone is also formed when cinchonidine is oxidized with chromic acid. The mercuriochloride can be isolated by repeatedly precipitating with mercuric chloride, and extracting the precipitate with boiling water; the hydrochloride, obtained by decomposing the double salt with hydrogen sulphide, is identical in chemical and optical properties with the corresponding compound obtained from cinchonine, quinine, and quinidine.

Quinicine, prepared by heating quinine hydrogen sulphate, was oxidized, and the crude product investigated exactly as has been previously described in the case of the other alkaloids. Considerable quantities of quinicic acid, cincholeuponic acid hydrochloride, and cincholeupone hydrochloride, identical in chemical and physical properties with the corresponding compounds obtained from quinine and quinidine, were isolated.

Cinchonicine on oxidation yields cincholeuponic acid, identical with the acid obtained from cinchonine and cinchonidine; cincholeupone has not yet been isolated from the oxidation-products, but that it is actually present is more than probable.

The investigation of the cinchona alkaloids has shown that not

only the four naturally occurring bases—quinine, quinidine, cinchonine, and cinchonidine,—but also the amorphous compounds, quinicine and cinchonidine, formed therefrom by intramolecular change, are so similar in constitution that the only difference in their decomposition-products is due to a difference in the empirical formulæ of the alkaloids. All six bases contain one and the same group of atoms, from which, on oxidation, cincholeupone is formed. Although the rotatory power of cincholeupone has not yet been determined, it must contain a dextro-rotatory group of atoms, because, on oxidation, it is converted into cincholeuponic acid ($[\alpha]_D = +35^\circ 61'$). Pasteur's hypothesis as to the cause of the peculiar optical properties of the cinchona alkaloids is fully borne out by the facts which have hitherto been brought to light.

Quinine, quinidine, and quinicine are most probably identical in structure and stereo-chemically isomeric, as are also cinchonidine, cinchonine, and cinchonidine. The first members of the two groups are analogous to lævo-tartaric acid, the next to dextro-tartaric acid, and the last numbers are analogous to optically-inactive tartaric acid. The analogy is, however, incomplete, as the optical activity of the alkaloids does not cease entirely when intramolecular change takes place. The cinchona alkaloids contain at least two, and, according to the researches of Jungfleisch and Léger, in all probability more than two, asymmetric carbon-atoms.

Kynurin (Hydroxyquinoline). Z. H. Skraup. (*Monatshefte*, x. 726-731.) This body, which is an oxidation-product of cinchonine and cinchonidine, may be obtained from cinchonidine by oxidation with chromic and sulphuric acids. Thus prepared, it melts at 210°C. , and has all the properties of the compound obtained by direct oxidation of cinchonine.

Morphine. Z. H. Skraup and D. Wiegmann. (*Monatshefte*, x. 732, 733.) The authors have repeated Knorr's experiments with codeine methiodide, and find that when this body is treated with alcoholic potash, ethyldimethylamine, and not dimethylamine, is formed. They regard this result as confirmatory of the supposition that the nitrogen-atom in morphine has both a methyl- and an ethyl-group directly attached to it.

Incompatibility of Codeine and Morphine Sulphate. E. Claassen. (*Journ. Soc. Chem. Ind.*, 1890.) The author points out that codeine is capable of decomposing morphine sulphate as well as morphine salts generally, with separation of morphine, which is insoluble in water. This reaction is sufficiently complete

to admit of its application to the estimation of the amount of codeine present in a liquid. For this purpose an excess of morphine sulphate is added to the warmed liquid, with frequent shaking, and after cooling the mixture is allowed to stand for forty-eight hours, and the separated morphine is collected on a tared filter. If, after addition of more morphine sulphate to the liquid, no further deposition takes place in twenty-four hours, the weight of the morphine obtained multiplied by 0.9868 gives the amount of anhydrous codeine, or multiplied by 1.0462 the amount of codeine crystallized with one molecule of water. Thus, 100 parts of anhydrous codeine decomposes 126.76 parts of morphine sulphate. In cases where codeine salts or morphine, or morphine salts, may be present, excess of magnesia is added and the mixture evaporated to dryness. The residue is now stirred up with some water, shaken several times with ether free from alcohol, the ether distilled off, and the residue exhausted with hot water. The codeine in the resulting solution can then be determined as above specified.

Note on Narceine. P. C. Plugge. (*Pharm. Journ.*, 3rd series, xx. 401.) The author refers to Merck's paper on "Chemically Pure Narceine," (*Year-Book of Pharmacy*, 1889, p. 58), which appears to him to throw doubt on the assumption that narceine is a very weak base, and which also contains the statement that the pure base, contrary to previous statements, possesses a faintly alkaline reaction. He gives experimental data on the strength of which he divided the opium alkaloids into strong and weak bases, and classed narceine with the last-named group. He also repeats the statement that narceine, in common with narcotine and papaverine, has no blue-colouring action upon a solution of red litmus, nor any power of neutralizing acids. He also impugns Laborde's assertion concerning the impurity and consequent inconstant therapeutical action of this alkaloid.

Chemically Pure Narceine. E. Merck. (*Pharm. Journ.*, 3rd series, xx. 481.) Replying to a recent "Note on Narceine" by P. C. Plugge (preceding abstract), the author denies having made any positive assertion in opposition to previous authors. What he wished to bring out was that chemically pure narceine, contrary to previous statements, possesses a *weak alkaline reaction*, and that it manifests quite a *peculiar affinity for acids*, on which account it holds an exceptional position among the opium alkaloids. To these statements the author adheres. He also repeats the observation that narceine is capable of combining chemically with

acetic acid. He also replies to the objections raised to some of his statements by D. B. Dott (*Year-Book of Pharmacy*, 1889, p. 471), but admits that what he said about basic salts might be open to the construction placed upon it by that chemist. He insists, however, on the importance of the melting point of narceine as a means of establishing its purity, stating that it is only when the base is absolutely free from acid and other foreign admixtures that it melts above 170° C. He again affirms that narceine containing hydrochloric acid cannot be perfectly freed from the acid by recrystallization.

With regard to the use of the alkaloid, the author says that he had expressly stated that "good commercial narceine might fully suffice for therapeutic use"; but he adds that chemists must be more thorough-going in their requirements as to the purity of the alkaloid, and that it was the object of his paper or "Chemically Pure Narceine" to show that.

Narceine Meconate. E. Merck. (*Chem. Centr.*, 1889, 384.) The author prepares narceine meconate by mixing the acid and base in equi-molecular proportions, which produces a lemon-yellow acid salt, soluble in hot water, little soluble in alcohol, readily soluble in 50 per cent. alcohol, and melting at 126° . Attempts to prepare the normal salt from narceine (2 mols.) and meconic acid (1 mol.) resulted in the formation of products varying in composition, the first portions which crystallized out being richer in meconic acid than the last.

The Mydriatic Alkaloids. E. Schmidt. (*Pharm. Zeitung*, September 25, 1889, 583.) The author reports that *Scopolia atropoides* and *Scopolia japonica* contain hyoscyamine and hyoscyne, and that the latter, hitherto known only as a syrup, has now been obtained in a crystalline form by C. J. Bender. Traces of a mydriatic alkaloid have been noticed in *Solanum tuberosum*, *S. nigrum*, and *Lycium barbarum*. Full-grown belladonna roots contain principally hyoscyamine, and no atropine; and they appear to undergo no change in this respect if kept for years after collection. The stage of growth, however, seems to have some influence on the nature of the alkaloids, since roots of one year's growth contain free atropine together with hyoscyamine, while the roots of old plants contain hyoscyamine only.

The Alkaloids of Scopolia Atropoides. C. Siebert. (*Archiv der Pharm.* [3], xxviii. 139-145.) The plant, a native of Germany, yielded hyoscyamine, a very small amount of atropine, and still less of hyoscyne. A little scopoletin was also extracted, but not

sufficient for analysis. The same remark applies to betain. Some choline was obtained, and its double chloride was analysed, but whether this substance occurs in the plant, or is produced by the decomposition of the lecithin contained therein, is doubtful.

In a footnote to this paper, E. Schmidt states that he has been presented by Bender with a sample of hyoscyne in very fine crystals, as well as with some beautiful large crystals of the hydrobromide. The hyoscyne is said to have been obtained in the working of about a hundred kilograms of roots of *Scopolia atropoides*.

A New Alkaloid from *Scopolia Atropoides*. E. Schmidt. (*Apotheker Zeitung*, 1890, 186.) Upon a close examination of the hyoscyne obtained by Bender from the roots of *Scopolia atropoides*, and placed by him at the author's disposal (see preceding abstract), the base in question proved to have a composition corresponding with the formula $C_{17}H_{21}NO_4$, and to differ from the hyoscyne of Ladenburg. The hydrobromide presented to him was also found to differ materially from hyoscyne hydrobromide as described by Ladenburg, and proved to be the salt of a new base. The most distinctive differences were observed in the characters of the gold salt when compared with that of Ladenburg's hyoscyne. Subsequently the author has found that the occurrence of this base is not limited to the root of *Scopolia atropoides*, but that it exists also in small quantities in *Atropa belladonna*, *Duboisia myoporioides* and *Datura stramonium*.

Commercial Hyoscyne Hydrobromide. E. Schmidt. (*Apotheker Zeitung*, April 12, 1890.) A commercial sample of hyoscyne hydrobromide examined by the author proved to contain both Ladenburg's hyoscyne and the new base referred to in the preceding abstract. The characters of the sample varied much from specimens of the salt previously examined; and the author therefore arrives at the conclusion that the hyoscyne salts met with in commerce differ considerably in their nature and composition.

Note on Pure Atropine Sulphate. J. B. Nagelvoort. (*Amer. Journ. Pharm.*, March, 1890.) An examination of trade specimens of atropine sulphate led the author to the conclusion that much of the salt now met with in commerce is really hyoscyamine sulphate, the action of which, however, is the same both on the healthy and the diseased eye.

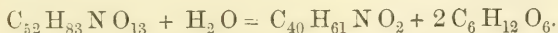
Belladonnine. E. Dürkopf. (*Ber. der deutsch. chem. Ges.*, xxii. 3183, 3184.) The evaporated mother-liquor from the preparation of atropine forms a brown syrup which is known in commerce as

belladonnine. It is a mixture of real belladonnine (the alkaloid), atropine, hyoscyamine, hyosine, and their decomposition-products, tropine, pseudotropine, and tropic acid. Upon digesting the acid solution of this mixture with ether and chloroform, to extract the hydrocarbons, etc., the remaining atropine may be split up into tropine and tropic acid, while hyosine (about 18 to 20 per cent.) remains in the solution, and belladonnine remains intact. Hyosine gives a gold salt melting at 200° C.

Bases contained in Young Shoots of *Solanum Tuberosum*. R. Firbas. (*Monatshefte*, x. 541-560; *Journ. Chem. Soc.*, January, 1890.) The two products, the one crystalline and the other amorphous, obtained in the preparation of solanine from the young shoots of the potato, are now shown, contrary to earlier views, not to be chemically identical. The author names the crystalline compound *solanine*. It has the formula $C_{52}H_{93}NO_{18} \cdot 4\frac{1}{2}H_2O$, and when dried at 100° appears to be anhydrous, or to contain only half a molecule of water of crystallization. From a solution in 85 per cent. alcohol, it crystallizes in colourless needles, which melt at 244° , are almost insoluble in ether or alcohol, and are readily dissolved by dilute hydrochloric acid. *Solanidine hydrochloride*, $3(C_{40}H_{61}NO_2, HCl) \cdot HCl + H_2O$ or $1\frac{1}{2}H_2O$, is obtained by boiling solanine with a 2 per cent. solution of hydrochloric acid. It is a slightly yellow powder which is only very sparingly soluble in water, and carbonizes without melting when heated to 287° . Simultaneously with solanidine hydrochloride, a sugar is formed in accordance with the equation—



The amorphous substance obtained simultaneously with solanine, and which the author names *solaneine*, has, when dried at 100° , the formula $C_{53}H_{87}NO_{13}$, or $C_{52}H_{83}NO_{13}$. The loss of weight on heating the air-dried compound at 100° corresponds with the formula $C_{52}H_{83}N + 3\frac{3}{4}O_{13}$ or $4H_2O$. It is a yellow, horny, perfectly amorphous substance, melting at 208° , is more soluble in an 85 per cent. solution of alcohol than is solanine, and on treatment with hydrochloric acid yields solanidine and a sugar in accordance with the equation—



The sugar obtained by the hydrolysis of solanine and solaneine forms a yellow, amorphous mass with a caramel-like odour, dissolves readily in water and wood-spirit, and has a specific rotatory

power of $[\alpha]_D = +28.623$. With phenylhydrazine hydrochloride and sodium acetate in aqueous solution, it forms a glucosazone melting at 199° , and resembling the compounds obtained similarly from dextrose, levulose, and several other sugars. With nitric acid it gives no recognisable trace of mucic or saccharic acids. The general behaviour of the sugar points to the conclusion that it is some other sugar than dextrose, or a mixture of sugars.

Solanidine has the formula $C_{40}H_{61}NO_2$, or $C_{41}H_{65}NO_2$, and is obtained from alcoholic solution in amorphous masses interspersed with needles melting at 191° . It dissolves readily in hot alcohol, with difficulty in ether, and on treatment with excess of dilute sulphuric acid forms a sulphate, $3(C_{40}H_{61}NO_2, H_2SO_4), H_2SO_4 + 8H_2O$; this crystallizes in scaly plates melting at 247° , and is readily soluble in water. Its diacetyl-derivative, $C_{40}H_{59}O_2NAc_2$, crystallizes in needles melting at 203° .

Cinnamylcocaine as a Natural Constituent of Coca Leaves. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 3rd series, xx. 166.) The authors have arrived at the conclusion that the mere fact of an alkaloid obtained from coca leaves being crystallizable from petroleum spirit cannot be relied upon as evidence of its being true cocaine. They have recently examined a sample of leaves yielding upwards of 1.75 per cent. of alkaloid, but containing very little cocaine, though the amount of base crystallizable from petroleum spirit was nearly .5 per cent. Upon examination this crystallizable alkaloid was found to give reactions indicating that it was in reality cinnamylcocaine. On oxidation with potassium permanganate, it gave off an abundant amount of bitter almond oil. The authors regard this as corroborative evidence of Liebermann's conjecture that cinnamylcocaine may occur as a natural constituent in coca leaves.

Occurrence of Cinnamylcocaine in Coca Leaves. F. Giesel. (*Pharm. Zeitung*, xxxiv. 516.) The author has isolated cinnamylcocaine from the crude coca bases, and has satisfied himself that its properties agree completely with those of the synthetically prepared specimens.

Cinnamylcocaine from Coca Leaves. C. Liebermann. (*Ber. der deutsch. chem. Ges.*, xxii. 2661, 2662.) The author's results confirm the identity of cinnamylcocaine prepared by him synthetically from eegonine with that obtained by Giesel from coca leaves.

Dextro-Cocaine. A. Einhorn and A. Marquardt. (*Ber. der deutsch. chem. Ges.*, xxiii. 469.) The authors found that by the action of potash eegonine is converted into a base, differing from

ordinary ecgonine in being much less soluble in absolute alcohol and having a much higher melting point, but especially in being dextro-rotatory. From this dextro-ecgonine a synthetic dextro-cocaine was obtained as a colourless oil, which was converted into a crystalline hydrochloride, much more difficultly soluble than ordinary cocaine hydrochloride, and melting at 205° instead of 181.5° C. A pharmacological examination of this dextro-cocaine showed that it exercises exactly the same influence as ordinary cocaine, except that the local anæsthetic action commences more rapidly and disappears in a shorter time.

Methyl Cocaine, a By-product in the Commercial Synthesis of Cocaine. C. Liebermann and F. Giesel. (*Ber. der deutsch. chem. Ges.*, xxiii. 508-512; *Journ. Soc. Chem. Ind.*, May 31, 1890.) What appears to be a methyl-cocaine has been obtained by the authors in small quantities from the mother-liquors in the synthetic method of preparation of cocaine from ecgonine. The free base, when separated from a salt by means of an alkaline carbonate, forms an oil which solidifies on standing, and which is readily soluble in ether, alcohol, benzene, and petroleum spirit. Its salts crystallize well, the difficultly soluble nitrate,



being especially characteristic. The hydrochloride, sulphate, gold and platinum double chlorides, are also described. Methyl cocaine is less readily decomposed by water or by hydrochloric acid than ordinary cocaine is. With acid, benzoylmethyl ecgonine hydrochloride, $(\text{C}_{17}\text{H}_{21}\text{N O}_4\text{H Cl})$, first results, and then methyl ecgonine, $\text{C}_{10}\text{H}_{17}\text{N O}_3$, which latter melts with decomposition at 264° , and forms a characteristic hydrochloride and gold double salt. The analytical data on which the determination of the composition of this methyl-cocaine rests are not sufficiently accurate to decide between the formulæ for cocaine and methyl cocaine, and the authors refer to the isomeride of cocaine described by Einhorn and Marquardt, which agrees in some of its properties, especially as regards the melting points of its hydrochloride and gold double salt, with this methyl cocaine. Further, the latter, as well as the "methyl ecgonine," have a dextro-rotatory power equivalent to that of the corresponding derivatives described by Einhorn and Marquardt. On the other hand, there are several differences to be noticed in the two series of compounds, so that their identity or otherwise still remains to be proved.

Dextro-Cocaine and Methyl Cocaine. C. Liebermann and F. Giesel. (*Ber. der deutsch. chem. Ges.*, xxiii. 926.) In this further research on the substance which the authors have recently described as "methyl cocaine" (see preceding abstract), they arrive at the conclusion that this body is probably identical with the dextro-cocaine obtained by Einhorn and Marquardt (see page 58).

On Dextro-Cocaine and its Homologues. A. Einhorn and A. Marquardt. (*Ber. der deutsch. chem. Ges.*, xxiii. 979-988.) This body was obtained in crystals melting at 43-45° C., by treating its solution with a crystal of benzoyl-dextro-ecgonine-ethyl-ester. Its gold and platinum double salts, the hydrobromide, hydriodide, nitrate, and sulphate are described. Whether dextro-cocaine is identical with Liebermann and Giesel's methyl cocaine is not yet finally decided, though the bases are very much alike; there are, however, slight differences, and further researches on this point require to be made.

Constitution of Ecgonine. C. Stoehr. (*Ber. der deutsch. chem. Ges.*, xxii. 1126-1129.) The results of the experiments detailed in this paper support the theory that ecgonine is a hydrogenized pyridine derivative.

Conversion of Anhydro-Ecgonine into Pyridine. A. Einhorn. (*Ber. der deutsch. chem. Ges.*, xxii. 1362-1368.) The solution obtained by heating anhydro-ecgonine with concentrated hydrochloric acid, contains methyl chloride, hydrocarbons, ammonia, methylamine, and other basic compounds. After removing the neutral compounds by distilling with steam, the solution is mixed with alkali, again distilled with steam, and the distillate shaken with ether. The ethereal extract contains a secondary and a tertiary base, which can be separated by means of nitrous acid. The nitroso-compound is decomposed by boiling concentrated hydrochloric acid, yielding a secondary base, the *aurochloride* of which crystallizes from hot water or alcohol in needles, melts at 186-187° with decomposition, and gives a pyridine base when distilled over zinc-dust.

When the bases obtained by heating anhydro-ecgonine with hydrochloric acid are directly converted into the hydrochlorides, and the latter distilled over zinc dust, hydrocarbons, pyridine, and another oily base are formed. The pyridine can be isolated by means of the *aurochloride*; this salt, and the *platinochloride*, were found to be identical in all respects with the corresponding compounds prepared from ordinary pyridine.

Ethoxycaffeine. H. Thoms. (*Pharm. Post*, 1890, 309. From *Pharm. Journ.*) Ethoxycaffeine, which some time since was strongly recommended, in doses of 0·25 gram, as a remedy for migraine, can, according to the author, be readily prepared by treating caffeine with large excess of bromine, added gradually in small quantities, the mixture being kept cool, and then adding to an alcoholic solution of the resulting monobromcaffeine, freed from excess of bromine, metallic sodium in small fragments sufficient to combine with the bromine, and boiling. Upon concentration of the alcoholic solution, the ethoxycaffeine separates in small white needles that can be purified by recrystallization from alcohol or water. The melting point of the crystals is 138° C., and the author recommends this as a means of distinguishing it from the much lower-priced caffeine with which it might be adulterated. Another point of difference is the behaviour of the two bases towards caustic potash or soda solution. A solution of 0·1 gram of caffeine in 50 c.c. of boiling water is not rendered turbid upon the addition of potash solution; whilst from a similar solution of ethoxycaffeine the compound is almost completely precipitated.

Amount of Alkaloid in Tea. J. H. Small. (*Amer. Journ. Pharm.*, March, 1890.) Eight commercial samples of tea were examined, with the following results, the alkaloid being estimated by the process of Paul and Cownley (see *Amer. Journ. Pharm.*, 1887, 628):—

Commercial Name.	Colour.	Theine.
Japan, uncoloured	greenish black . .	1·79 per cent.
Japan, coloured	bluish green . . .	2·30 „
Indian, fine white top . . .	black	3·51 „
Foochow	black	3·40 „
Young Hyson	bluish green . . .	3·26 „
Congo	black	3·52 „
Chinese imperial	bluish green . . .	2·85 „
Formosa	black	2·38 „

Purification of Berberine. E. Schmidt. (*Chem. Centr.*, 1889, ii.) A salt of berberine is dissolved in water, acetone and sodium hydrate added, and after the liquid has cooled the crystalline acetone berberine is collected and washed. The berberine salts are obtained by boiling the above compound with dilute acids, and the free alkaloid by heating with chloroform and alcohol; these solvents are distilled off, and after cooling the alkaloid is recrystallized from water.

Hydrastine. M. Freund. (*Ber. der deutsch. chem. Ges.*, xxii. 1156-1160.) In a previous report on this subject (see *Year-Book of Pharmacy*, 1889, 63), the author dealt with the oxidation of hydrastine in the cold by means of potassium permanganate, resulting in the formation of hydrastinine. He now shows that excess of the oxidizing agent and slight heating carries the oxidation further, to *hydrastinic acid*, $C_{11}H_{11}NO_5$, a substance which is soluble in alcohol and ether, almost insoluble in chloroform. It crystallizes in flat needles and melts at 164° . It gives no precipitate with silver or lead salts. The *barium salt*, $(C_{11}H_{10}NO_5)_2Ba + 5H_2O$, forms white needles, soluble in water, very sparingly so in alcohol. It loses its water of crystallization at 130° . When the free acid is melted, it gives off carbonic anhydride, and yields a crystalline substance melting at 215° , and soluble in soda. A small quantity of a substance melting at 260° is also formed. When boiled with dilute nitric acid, the acid yields a crystalline compound melting at 230° .

Hydrastine. M. Freund and S. Lachman. (*Ber. der deutsch. chem. Ges.*, xxii. 2322-2328.) The oxidation product of hydrastine described by one of the authors under the name of *hydrastinic acid* (preceding abstract), is now reported to correspond to the formula $C_{11}H_9NO_6$. The substance previously investigated was found not to be quite pure, but still to contain some oxyhydrastinine.

Hydrastine. M. Freund and A. Rosenberg. (*Ber. der deutsch. chem. Ges.*, xxiii. 404-415.) This paper deals with *methylhydrastine* and *ethylhydrastine*, and some of their decomposition products. For particulars reference should be made to the original.

Hydrastine. W. Kerstein. (*Chem. Centr.*, 1889, ii. 91; *Journ. Chem. Soc.*, January, 1890.) According to the author's experiments, hydrastine, obtained from the root of *Hydrastis canadensis*, has the formula $C_{21}H_{21}NO_6$, and forms colourless needles melting at 132° . The *hydrochloride*, $C_{21}H_{21}NO_6 \cdot HCl$, and *hydrobromide*, $C_{21}H_{21}NO_6 \cdot HBr$, are white, micro-crystalline salts; the *hydriodide* is brownish yellow.

In addition to those reactions already described, showing the relation which exists between hydrastine and narcotine, the author finds that by oxidation with potassium permanganate in acid solution, opianic acid, and probably also cotarnine, are formed. When distilled in a current of steam, meconine and trimethylamine are formed in the case of both these alkaloids. On the other hand, they do not show any similarity in their behaviour

towards acetic anhydride, acetic chloride, water under pressure, or dilute sulphuric acid.

From hydrastine ethiodide, by the action of potassium hydroxide solution, *ethylhydrastine* is obtained; it forms lemon-yellow crystals which melt at 127° . By the action of iodine, hydrastine is split up into opianic acid and hydrastonine; the latter is distinguished from tarconine methiodide in that no formaldehyde is formed on boiling its iodide or hydroxide with barium hydroxide.

In addition, from the root of *Hydrastis canadensis*, the author has separated *phytosterin*, $C_{26}H_{44}O + H_2O$; this forms plates, melting at 133° , the solution of which in acetic anhydride gives a red coloration, passing into intense blue with concentrated sulphuric acid.

Hydrastine. E. Schmidt and W. Kerstein. (*Archiv der Pharm.* [3], xxviii. 49–73.) The authors' investigation confirms the view that hydrastine contains one methoxyl group less than narcotine.

In the same paper hydrastine hydrochloride, $C_{21}H_{21}NO_6 \cdot HCl$, and *ethylhydrastine*, $C_{21}H_{20}EtNO_6$, are described.

Note on an Official Test for Physostigmine. J. C. Umney. (*Pharm. Journ.*, 3rd series, xx. 1061.) The author points out an omission in one of the tests for this alkaloid given in the British Pharmacopœia, and suggests that in future editions of this work the passage in question should read, "when evaporated to dryness over a water bath *with ammonia*, the aqueous solution leaves a bluish residue, the acidified solution of which is beautifully dichroic, being blue and red."

Salicylate of Eserine. A. Petit. (*Journ. de Pharm. et de Chim.*, December, 1839.) Sulphate of eserine being deliquescent and difficult to weigh, the author proposes to substitute for it the salicylate of eserine, which crystallizes well, is neutral, and is easy to weigh; it remains unchanged for an indefinite period.

Ulexine and Cytisine. R. Kobert. (*Deutsch. med. Wochenschrift*, May 8, 1890, 406.) The author calls attention to the close resemblance of the physical and chemical properties attributed to cytisine, the alkaloid from laburnum, with those of ulexine, the alkaloid from *Ulex Europæus* described by Gerrard and Symons. He also shows that this resemblance extends to their therapeutic properties. Under these circumstances he appears inclined to regard these two bodies as probably identical.

Ulexine and Cytisine. A. W. Gerrard and W. H. Symons. (*Pharm. Journ.*, 3rd series, xx. 1017.) A recent expression of

opinion by R. Kobert as to the probable identity of ulexine and cytisine (preceding abstract), has induced the authors to enumerate some physical differences which, if the properties assigned to cytisine are correct, would, in their opinion, prove them to be separate bodies, even if the chemical evidence were not considered sufficient to show them to be distinct alkaloids. These differences are tabulated as follows:—

Cytisine. $C_{20}H_{27}N_3O$.	Ulexine. $\frac{1}{2}C_{22}H_{28}N_4O_2$.
Permanent in air. Sublimes completely, forming splendid crystals. Scarcely soluble in chloroform. Formula weight, 324.41.	Very hygroscopic. Refuses to sublime in air without decomposition, and when heated <i>in vacuo</i> does not sub- lime to any extent at 225° C. Freely soluble in chloroform. Formula weight $\times 2$, 379.34.

As regards ulexine, the authors have further confirmed these results by recent experiments.

Lobeline. H. Paschkis and A. Smita. (*Monatshefte*, xi. 131, 132; *Journ. Soc. Chem. Ind.*, 1890, 761.) To obtain the alkaloid from *Lobelia inflata*, the leaves are extracted with warm water acidified with acetic acid, the extract concentrated, made alkaline, and the alkaline solution extracted with ether. The acid extract is then treated with water, rendered alkaline, and again extracted with ether. After distilling off the latter, the alkaloid remains as a viscous honey-coloured oil, with a smell akin to that of honey and tobacco. For further purification the oil is dissolved in ether, extracted with water acidified with hydrochloric acid, the acid extract then rendered alkaline, and the resulting solution again extracted with ether. After distilling off the ether, the residue is dried over caustic alkali and distilled in a current of hydrogen. When lobeline or its sulphate is suspended in a 10 per cent. caustic potash solution, and a 4 per cent. solution of potassium permanganate is gradually added, the whole being gently warmed on a water-bath, benzoic acid results, which can be extracted by means of ether after filtering off the manganic hydrate and acidifying the resulting solution. The identity of the acid formed with benzoic acid was proved by analysis and by its characteristic properties, whence it appears that lobeline contains an aromatic nucleus.

Further investigations on lobeline are in progress.

Distinction between Nepaline and Aconitine. K. F. Mandelin. (*Zeitschr. für analyt. Chem.*, vol. xxviii. part 6, 760.) Nepaline, if evaporated down with a few drops of strong nitric acid, gives a residue smelling of musk. This residue, if treated with a few drops of a solution of potash in absolute alcohol, gives an intense carmine or purple. Aconitine is quite indifferent in its behaviour. 0.01 milligram of nepaline is sufficient to produce a distinct reaction.

The Alkaloids of Ipecacuanha. M. Arndt. (*Pharm. Zeitung*, Sept. 25, 1889, 585.) The author calls attention to the disturbing influence the volatile alkaloid discovered by him in ipecacuanha (*Year-Book of Pharmacy*, 1889, p. 136) is likely to exercise on determinations of emetine in the root. The former is stated to amount to about 0.3 per cent., while the proportion of real emetine varies from 0.6 to 1.1 per cent. The volatile base occurs in the root as tannate; at an ordinary temperature it is a yellow oil, which forms pearly crystals when reduced to a low temperature.

Taxine, the Alkaloid of the Yew Tree (*Taxus Baccata*). A. Hilger and F. Brande. (*Ber. der deutsch. chem. Ges.*, xxiii. 464-468; *Journ. Soc. Chem. Ind.*, May 31, 1890.) Bujardin, Schroff, and Lucas have pointed out the presence of a narcotic substance in the leaves, shoots, and fruit of the yew tree; whilst Marmé isolated the alkaloid in question by extracting the leaves, etc., with ether, treating the residue, after distilling off the ether, with dilute acid, and then precipitating the base by means of ammonia. The authors have adopted this method of Marmé's for the extraction of the alkaloid, to which the name of *taxine* is given. The acid extract (sulphuric acid was used) is coloured at first, but on repeating the treatment with acid and ammonia two or three times, a perfectly colourless product is obtained in the form of a white amorphous powder, melting at 82° C. All attempts to obtain the alkaloid in a crystalline condition failed. Taxine, when heated in a glass tube, forms a white cloud, which condenses in oily drops on the cool parts of the tube. These drops solidify on cooling. At the same time it gives off a characteristic aromatic odour. It dissolves readily in alcohol and ether, less readily in chloroform, very slightly in water, and is insoluble in benzene. With concentrated sulphuric acid an intense purple-violet coloration results, whilst the slightly acidified aqueous solution of the base gives yellow precipitates with solutions of iodine and of bismuth iodide in potassium iodide, a pale yellow precipitate with sodium phosphomolybdate, and a white precipitate with the fixed alkalies and with ammonia, insoluble in excess. Gold chloride, platinic chloride, and

picric acid also produce characteristic precipitates of double salts. The alkaloid possesses a very bitter taste. Taxine forms a series of very soluble salts, of which the acetate, oxalate, tartrate, hydrochloride, and sulphate have been prepared. It is difficult to obtain them in a crystalline form, the hydrochloride being prepared as a crystalline precipitate by passing dry hydrochloric acid gas into an anhydrous ethereal solution of the base. Analyses of the free base, its hydrochloride, sulphate, and also of its difficultly soluble double salts with the chlorides of gold and of platinum, are given, which point to the empirical formula, $C_{37}H_{52}O_{10}N$, for the alkaloid. It is mon-acid. Heated with ethyl iodide in a closed tube to 100° , a crystalline product, $C_{37}H_{52}O_{10}N \cdot C_2H_5I$, results, pointing to the fact that taxine is a nitrile base.

Mandragorine. F. B. Ahrens. (*Ber. der deutsch. chem. Ges.*, xxii. 2159-2161; compare also *Year-Book of Pharmacy*, 1889, 155.) The author has further investigated mandragorine, the alkaloid of mandragora root. It is colourless, inodorous, deliquescent, soluble in the ordinary solvents, and produces mydriasis. The sulphate and hydrochloride are crystalline and deliquescent. Mandragorine has the formula $C_{17}H_{27}NO_3$. It is not converted into atropine by alkalies.

Ephedrine and Isoephedrine. N. Nagai. (*Chem. Zeitung*, 1890, 441.) The author obtained the alkaloid ephedrine from the stem of *Ephedra vulgaris*. The composition is $C_{10}H_{15}NO$; by oxidation the alkaloid is split into benzoic acid, monomethylamine, and oxalic acid. Isoephedrine (melting point $114^{\circ}C$.) is obtained by heating ephedrine (melting point $30^{\circ}C$.) with hydrochloric acid in a closed tube to $180^{\circ}C$. The constitution of ephedrine is $C_6H_5CH_2CH(NHCH_3)CH_2OH$, and that of isoephedrine is $C_6H_5CH_2C(OH)(NHCH_3)CH_3$.

Avenine. E. Wrampelmeyer. (*Landw. Versuchs-Stat.*, xxxvi. 299-301.) The author doubts the existence of avenine, the alkaloid alleged to be present in oats. He has worked upon large quantities of oats without obtaining any indication of an alkaloid.

The Alkaloidal Constituents of Cod-liver Oil. A. Gautier and L. Mourgues. (*Bull. Soc. Chim.*, 1889, ii. 213-238. From *Journ. Soc. Chem. Ind.* See also *Year-Book of Pharmacy*, 1888, 32, 1889, 69.) In pursuance of the authors' work on this interesting and important subject, they now present a full account of their results, dealing both with the chemical nature of the cod-liver oil bases and their therapeutic value. The oils to which most attention was

paid were the light-brown samples which are generally admitted to be the most active. Such oils are not obtained by extraction from the perfectly fresh livers, but are produced after a certain fermentative change, distinct from putrefaction, has taken place, which causes them to contain biliary products. The sample worked upon came from Bergen, and its purity was assumed from the evidence afforded by its direct origin, its specific gravity ($\cdot 928$ at 15° C.), its rise of temperature with sulphuric acid ($89\cdot 3^{\circ}$ C.), and by its remaining fluid at 0° C. After many experiments and the qualitative proof of the presence of alkaloids, the following plan was adopted for their extraction:—100 kilos. of the oil were extracted with an equal volume of 35 per cent. alcohol containing 3 grms. of oxalic acid per litre, by shaking in 20 bottles of a capacity of 15 litres each. Oxidation was prevented by replacing the air by carbon dioxide. The extract was nearly neutralized with milk of lime, filtered, and distilled *in vacuo* at 40° C. When the bulk of the solution had been reduced to one-twentieth, lime was added to complete neutrality, and the evaporation finished *in vacuo*. The residue was treated with 83 per cent. alcohol, the solution filtered, distilled *in vacuo*, potash added to the residue, and the bases thus freed shaken out with ether. From their ethereal solution they were precipitated by powdered oxalic acid, the oxalates washed with ether and dried. By this means 53 grms. of oxalates were obtained, and subsequent examination of the extracted oil showed it to be almost free from basic constituents. It appears, therefore, that the light-brown oil contains as much as $0\cdot 5$ gm. of mixed alkaloids per kilo., equivalent to about $6\cdot 5$ mgrms. in a spoonful weighing $13\cdot 5$ grms., whereas the almost colourless specimens gave no weighable quantity when as much as 10 kilos. were treated. From 52 grms. of the crude oxalates, $26\cdot 5$ grms. of free dried alkaloids were obtained. By fractional distillation, and crystallization of the chloroplatinates, there were separated and identified—

1. Butylamine, consisting chiefly of normal butylamine, but having its boiling point raised by the presence of a little amylamine. Its physiological action was tried on a young guinea-pig, $0\cdot 025$ gram being injected, producing stupor and increasing the secretion of urine.

2. Amylamine, found to be chiefly iso-amylamine, corresponding to fermentation amyl alcohol. It was extremely poisonous, 4 mgrms. of the hydrochloride subcutaneously injected into a greenfinch causing death in three minutes; smaller doses increase the flow of urine.

3. Hexylamine, having a physiological action similar to, but weaker than that of, amylamine.

4. *Dihydrolutidine*, a new base forming about one-ninth of the total quantity of alkaloids extracted from the oil, being obtained from the fraction boiling between 198° and 200° at 770 mm. Analysis gave the figures $C = 77.31$, $H = 10.47$, $N = 12.52$ parts per cent. respectively, instead of the theoretical values $C = 77.07$, $H = 10.09$, $N = 12.84$, which correspond to the formula $C_7H_{11}N$, lutidine being C_7H_9N . Its vapour density, determined by Victor Meyer's method, using a bath of diphenylamine vapour, was 3.3 instead of 3.8. It is a colourless somewhat oily liquid, alkaline and caustic, with a pungent but not disagreeable odour. It absorbs carbon dioxide from the air, and is slightly soluble in water. Its boiling point is $199^{\circ}C.$ (corr.). The hydrochloride crystallizes in ill-defined needles or plates, has a bitter taste, is very soluble in water though not deliquescent, and in aqueous solution is partially dissociated at $100^{\circ}C.$ The nitrate reduces silver nitrate just as the hydropyridines do (Hofmann). The sulphate is somewhat bitter, odorous, and deliquescent, and crystallizes in needles arranged in stellate groups. The chloroplatinate is a canary-yellow salt crystallizing in needles or lozenge-shaped plates, soluble in hot water, but sparingly in the cold; it loses hydrochloric acid when boiled with water. The double salt formed with gold chloride forms thin lozenge-shaped plates, or in needles disposed fan-wise. When dihydrolutidine is mixed with a slight excess of methyl iodide in the cold, a confused mass of crystals of methyldihydrolutidine iodide separates out, from which weak potash liberates methyldihydrolutidine, which is one of the dihydrocollidines already known. Unlike the products of the action of methyl iodide on most of the pyridine bases, methyldihydrolutidine does not give a red coloration with strong hot caustic potash. From its behaviour on oxidation with potassium permanganate, and the nature of the products, the authors are of opinion that dihydrolutidine contains two side chains, and corresponds to the formula $C_5H_3(H)(CH_3)_2NH$, and may be regarded as a dimethyldihydropyridine. Dihydrolutidine is fairly toxic; a dose of 0.07 gram per kilo. first caused trembling and excitement, followed by depression and partial paralysis, when administered to a guinea-pig. Death commonly follows.

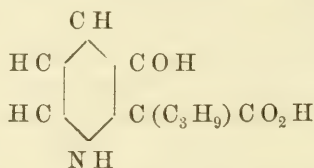
5. *Aselline*, $C_{25}H_{32}N_4$. — After the separation of the above-mentioned bases by distillation, a new fixed base, yielding a sparingly soluble chloroplatinate, is obtained as a greyish amorphous

non-hygroscopic mass, becoming yellowish when exposed to air and light. It has a density of 1.05, and fuses to a brown liquid with an odour recalling that of certain ptomaines. It is only slightly soluble in water (yielding an alkaline, slightly bitter solution, from which it is precipitated by potash), but is easily soluble in ether and alcohol. Concentrated sulphuric acid gives a faint red coloration, soon becoming brown. Its salts are partially dissociated by water, the base being precipitated. The hydrochloride crystallizes in small confused crosses, and is rather bitter. It forms a double salt with gold chloride, sparingly soluble, and depositing metallic gold on heating its solution, a white one with mercuric chloride, and a yellow easily alterable compound with platinic chloride. Aselline constitutes about one-fifteenth of the total bases; with regard to its physiological action, a small dose produces stertorous breathing and stupor; a large one, convulsions and death.

6. *Morrhaine*, $C_{19}H_{27}N_3$.—The chloroplatinate of this new base is more soluble than that of aselline, and is obtained after the removal of the latter. The base is a yellowish oily liquid with an odour of *Seringa flowers*. It is slightly soluble in water, freely soluble in alcohol and ether, strongly alkaline, and absorbs carbon dioxide from the air. It precipitates cupric salts, but does not redissolve the precipitate. Its hydrochloride crystallizes in needles forming stellate groupings, and is very deliquescent; the double salt with gold chloride is easily reduced on heating its solution; that with mercuric chloride is soluble, while the chloroplatinate crystallizes in feathery needles sometimes agglomerated with rounded masses. Its physiological action is of especial interest, inasmuch as it forms rather more than a third of the total bases, and thus any activity that it may possess would largely account for the therapeutic value of the oil. Its toxicity is slight, but it is a powerful diuretic and sudorific. It greatly aids assimilation and increases the appetite. 29 mgrms. injected as hydrochloride into a guinea-pig weighing 235 grams caused micturition no fewer than five times in 2 hours 12 minutes, the animal losing 12.5 grams. This corresponds to the passage of 3,872 grams in the case of a man, the normal maximum being 1,400 grams in two hours. *Morrhaine* then is the characteristic active constituent of cod-liver oil.

Besides these alkaloids there are found in the alcoholic extract from cod-liver oil several complex *lecithins* and other organic bodies containing phosphorus, which doubtless add to the medicinal pro-

perties of the oil by presenting that element in an easily assimilable form. In the original extraction of the oil by alcohol, certain acids are removed from it as well as the bases, and remain as potassium salts after the latter have been shaken out by ether in the scheme of extraction detailed above. They can be obtained by acidulation by sulphuric acid, and comprise formic and butyric acids, phosphoric and glycerin-phosphoric acids, and *morrhucic acid*, the most important in therapeutic effect. *Morrhucic acid*, $C_9H_{13}NO_3$, is probably contained in the oil in the form of lecithins or similar bodies, from which it separates on evaporating the acidulated alcoholic extract. When purified, it crystallizes in dirty yellow prisms or plates. It is slightly soluble in water, freely soluble in alcohol, and behaves both as an acid and base, combining with both alkalis and acids. It forms double salts with platinum and gold chlorides. From its behaviour on distillation with alkalis and oxidation with permanganate, the authors believe it to contain the pyridine nucleus, and one carboxyl group united with that nucleus *indirectly*, and assign to it the formula—



The *Gadvine* of De Jongh seems to be identical with *morrhucic acid*, although stated by him to contain no nitrogen. The physiological action of *morrhucic acid* was found to be to increase the appetite and renal secretion. The latter property is particularly striking when a guinea-pig is used for experiment, as normally the urine of that animal is turbid and scanty, becoming clear and abundant after the administration of the dose.

Cod-liver oil may, therefore, be regarded as a vehicle and store-house for quite a number of active principles tending to increase excretion and appetite, while presenting a certain quantity of food-substances in a highly assimilable form.

Solubility of Alkaloids in Ether. K. Tamba. (*Chemist and Druggist*, April 12, 1890.) The author finds that 100 grammes of absolute ether will dissolve the following weights of alkaloids:—

Strychnine	0.0232 gramme.
Morphine	0.0250 „
Brucine	0.5033 „
Atropine Sulphate	0.0070 „
Strychnine Nitrate	0.0013 „
Morphine Sulphate	0.033 „
Narcotine	0.387 „
Narceïne	0.0033 „
Thebaine	0.5233 „
Veratrine	1.527 „
Colchicine	0.510 „

Oxidation of Cantharidin. F. Anderlini. (*Ber. der deutsch. chem. Ges.*, xxiii. 485, 486.) Cantharidin is oxidized by prolonged boiling with concentrated nitric acid, but the products cannot be separated from unchanged cantharidin.

Digitalin. A. Arnaud. (*Comptes Rendus*, cix. 679–682.) The author regards crystallized digitalin obtained by Nativelle's method as a distinct chemical principle of marked individuality. When subjected to fractional solution, the melting points of the different fractions varied only between 242° and 245°.

Digitalin and Tanghinin. A. Arnaud. (*Comptes Rendus*, cix. 701–703.) Digitalin, when heated in a sealed tube with barium oxide and water to 180° C., yields a crystalline compound having the composition $(C_{31}H_{51}O_{11})_2 Ba$. It is insoluble in water, but somewhat soluble in boiling alcohol. It is the barium derivative of the compound, $C_{31}H_{52}O_{11}$, which is formed from digitalin, $C_{31}H_{50}O_{10}$, by the assimilation of water.

Tanghinin, under similar conditions, yields a barium derivative of the compound $C_{27}H_{44}O_{10}$, which is formed by the assimilation of 2 molecules of water by the tanghinin. The composition of the latter is therefore represented by the formula $C_{27}H_{40}O_8$. (Compare also *Year-Book of Pharmacy*, 1889, p. 164.)

Methysticin. C. Pomeranz. (*Monatshefte*, x. 783–793; compare also *Year-Book of Pharmacy*, 1889, 72.) The author has further investigated this constituent of the root of *Macropiper methysticum*. It may be prepared by boiling the roots with 80 per cent. alcohol; the solution is concentrated and allowed to remain in a cool place for some days, when a crystalline deposit separates, and this on recrystallization from boiling alcohol furnishes pure methysticin in the form of inodorous, tasteless, prismatic needles melting at 137°. Its composition corresponds to the formula $C_{15}H_{14}O_5$. It is insoluble in cold water, slightly soluble in hot water, petroleum ether and ether, more soluble in cold

alcohol, chloroform and benzol, and very soluble in boiling alcohol. It is not volatile, decomposing on heating, with evolution of aromatic yellow vapours. With concentrated sulphuric acid it produces a purplish-violet coloration. Methysticin is the methyl ether of *methystic acid*, $C_{14}H_{12}O_5$. The statement that upon oxidation it yields benzoic acid is contradicted by the author.

Ricin, the Poisonous Principle of Castor-oil Seeds. Dr. H. Stillmark. (*Pharm. Journ.*, from *Arbeit des pharmakol. Inst. Dorpat.*, Part iii. 59.) The poisonous principle present in castor-oil seeds has been variously represented as an alkaloid, a glucoside, and an organic acid. The author, however, arrives at the conclusion that it is an albuminoid body, identical with the " β -phyt-albumose," separated from the dried juice of *Carica Papaya* by Sidney Martin, and belonging to the class of unformed ferments. This substance, which has been named "ricin," is prepared by exhausting well-pressed peeled ricinus seeds, reduced to powder with a 10 per cent. solution of sodium chloride, saturating the clear percolate at the ordinary temperature with magnesium sulphate and sodium sulphate, and keeping it in a cool place, when, besides large crystals of the two sulphates, a white precipitate easily separable from these is formed. This is placed in a dialyser, with frequent changes of water, for six days, after which the residue is removed and dried over sulphuric acid, and can then be reduced to a snow-white powder, which still contains 10 to 20 per cent. of sulphate. This substance is a most powerful poison, exercising a remarkable power of coagulation, so that the blood coming into contact with a minute quantity that has been absorbed is coagulated, blocks the lumina of the intestinal capillaries, and causes thrombosis and echymosis. Even when introduced subcutaneously, the principal action of the poison appears to occur in the intestinal canal, and not at the place of injection. The lethal dose for a man weighing sixty kilograms is estimated as 0.18 gram, and it is stated that this quantity is contained in the press cake from 3 grams of peeled seeds. In view of this fact, that the residue from the pressing of castor oil contains such large quantities of a tasteless poison, exceeding arsenic in toxic power, and at present not to be detected in the body by any known method, the author raises the question whether it should not be made compulsory upon manufacturers to burn the cake or render it harmless by a process of boiling that would destroy the ferment. Experiments were also made upon the seeds of nine other species of ricinus, as well as those of *Croton Tiglium* and *Jatropha Curcas*, and in each case a

poisonous albuminoid substance was separated, similar to if not identical with ricin, and belonging to the class of ferments. It is pointed out by the author that the coagulating power of ricin explains the external application in some countries of crushed ricinus seeds as a hæmostatic.

Frangulin. T. E. Thorpe and H. H. Robinson. (Abstract of a paper read before the Chemical Society, December 19, 1889. From the Society's Proceedings.) The authors prepared the glucoside frangulin from the bark of the alder (*Rhamnus frangula*) by first extracting with low-boiling petroleum to remove plant fat, and next with methylated spirit, which removed the frangulin together with resins, etc. To this extract lead acetate was added to precipitate tannins, and after removing the excess of lead in the filtrate by means of sulphuretted hydrogen, the frangulin was obtained from it. 14lbs. of the bark gave about $5\frac{1}{2}$ grams of frangulin.

Seven analyses were made of four different portions of frangulin which had been purified by different methods, and the results agreed with one another and corresponded to the formula $C_{22}H_{22}O_9$; for every analysis the frangulin was dried at 120° until constant.

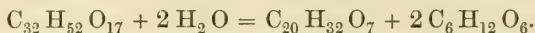
The frangulin was hydrolysed and the yellow product, insoluble in water, was analysed, in two cases after crystallizing from alcohol and drying at 120° until constant, and in two cases after crystallizing from benzene and drying at 180° . The results corresponded to the formula $C_{15}H_{10}O_5$. The product was directly compared with some emodin from rhubarb, and was found to give the same colour reactions, and the authors are satisfied as to its identity with that substance.

A phenylhydrazine-derivative of the product, soluble in water, and which has the power of reducing Fehling's solution, was prepared and compared with that obtained from glucose, and was found to possess quite different properties: hence it is concluded that the soluble product of the hydrolysis is not glucose.

The investigation of this soluble product, and of the equation representing the hydrolysis, will be continued by one of the authors.

Senegin. A. Funaro. (*Gazetta Chim. Ital.*, xx. 21.) The author's analysis of senegin, the glucoside of senega root, leads to the formula $C_{32}H_{52}O_{17}$, which differs from that found by Rochleder, ($C_{32}H_{54}O_{18}$). Its decomposition into senegenin, $C_{20}H_{32}O_7$, and

glucose is represented by him as in accordance with the following equation :—



The author appears to consider senegin and saponin as different compounds, but as closely related.

Peucedanin and Ostruthin. A. Jassoy. (*Apoth. Zeitung*, v. 150. From *Amer. Journ. Pharm.*) According to the author peucedanin, the bitter principle of *Peucedanum officinale*, has the composition $\text{C}_{15}\text{H}_{14}\text{O}_4$, and is the methyl-ether of oreoselon, $\text{C}_{14}\text{H}_{11}\text{O}_3\text{OH}$, a phenol-like body. By the action of bromine on peucedanin and oreoselon a monobromoreoselon is obtained; nitric acid acting on either gives mononitrooreoselon and styphnic acid. Acid anhydrides do not act on peucedanin, acid chlorides split off methyl chloride and form acid ethers. *P. officinale* contains another bitter principle, *oxypeucedanin* (Erdmann), in smaller quantity however. *Ostruthin*, the bitter principle of *Imperatoria Ostruthium*, has the formula $\text{C}_{18}\text{H}_{20}\text{O}_3$. It does not contain a methoxyl group, but a phenol-like hydroxyl. The ethers can be made with the acid anhydrides while the chlorides decompose the ostruthin. Peucedanin is not present in the latter rhizome at any time.

Tiliacin. P. A. Latschinow. (*Chem. Zeitung*, 1890, 126.) The leaves of the lime tree, *Tilia Europea*, contain a glucoside, *tiliacin*, which may be split up into glucose and *tiliaretin*. The latter is decomposed into *anisic acid* and other bodies not further studied. Tiliacin seems also to be contained in the leaves of *Cirsium arvense*.

Leptotrichic Acid. J. Amaun. (*Pharm. Journ.*, 3rd series, xx. 6.) Under this name the author records the first example of a crystallizable product obtained from the *Muscineæ*. He procured it from *Leptotrichum glaucescens*, the glaucous appearance of which moss is caused by a white scurfy coating which protects it from the action of water like a coating of wax. He finds this substance to be very soluble in ether, chloroform, or hot alcohol of 90 per cent. The concentrated solution in ether has an acid reaction, and the acid crystallizes out on evaporation in the form of prismatic needles. It is distinguished by its powerful resistance to concentrated sulphuric and hydrochloric acid, which scarcely affect it, nor is it attacked by caustic alkalies in the cold. The author finds this substance present in the green parts of the moss

to the extent of 13 per cent. of its weight. No chemical formula is given.

The Tannin of Quercus Alba. H. Kraemer. (*Amer. Journ. Pharm.*, May, 1890). The tannin of *Quercus alba* yields upon sublimation a crystalline principle somewhat resembling pyrocatechin. Upon atmospheric oxidation it gives the insoluble red or phlobaphene; and upon fusing some of the tannin with potassium hydrate it yields a phenol similar to protocatechuic acid.

The aqueous solution of the tannin is light yellow in colour; it reddens blue litmus and gives the following reactions:—

With Fe_2Cl_6 , an olive-brown colour possessing a slight fluorescence; in strong solutions a dark olive-brown precipitate.

With alkalis, a deep red colour, having also a decided blue fluorescence.

With $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$, a flocculent precipitate (hardly white).

With $\text{K}_6\text{Fe}_2(\text{CN})_{12} + \text{NH}_3$, a deep red colour.

With AgNO_3 , on application of heat, a reduction to metallic silver.

With Fehling's solution, on application of heat, the usual reduction.

With uranium acetate, a red-brown precipitate, redissolving in acetic acid.

The alkaline solutions of the tannin upon certain conditions possess a blue fluorescence. This fluorescent principle was present in the largest proportion in bark recently collected, and but sparingly in many of the older commercial barks. Whether this fluorescence is a property of the tannin or of a decomposition-product of it, remains still to be decided.

Tannin in Indian and Ceylon Teas. D. Hooper. (*Chemical News*, lx. 311, 312.) The tannin in various samples of tea was estimated by precipitation with lead acetate, and the tabulated results indicate that the quantity present was not much influenced either by the quality of the tea or by the altitude at which it was grown. With 1 part of tea to 100 of boiling water, about 30 per cent. of the tannin in tea is extracted in five minutes, and about 50 per cent. in ten minutes. The proportion of tannin in the numerous samples examined varied from 10 to 24 per cent.

Tannin. C. Etti. (*Pharm. Journ.*, 3rd series, xx. 424.) The author states that he has now obtained from oak barks of different origin a series of three tannin acid compounds, represented by the formulæ, $\text{C}_{16}\text{H}_{14}\text{O}_9$, $\text{C}_{17}\text{H}_{16}\text{O}_9$, and $\text{C}_{18}\text{H}_{18}\text{O}_9$, one from the bark of

the red beech, with the formula, $C_{20}H_{22}O_9$, and another from hop strobiles, represented by the formula, $C_{22}H_{26}O_9$. At present, therefore, the C_{19} and C_{21} compounds are wanting in this homologous series. Each compound is said to have its particular colour, ranging from brown red to light red. Whilst two of the acids from oak bark, when dissolved in very weak spirit, give with ferric chloride a dark blue colour, like gallic acid, the other acids mentioned give with ferric chloride different shades of green.

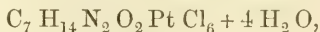
Proteïds. P. Limbourg. (*Zeitschr. für physiol. Chem.*, xiii. 450-463.) This research deals with the changes which fibrin and casein undergo when dissolved in saline solutions. The chief proteïds thus entering into solution are found to be globulins, with a certain amount of a peptone-like substance. The temperature at which coagulation takes place is shown to vary very much with the strength of the saline solvent and the reaction of the solution.

The Proteïds of White of Egg. G. Corin and E. Berard. (*Archiv. Biol.*, ix. 1-16.) The authors' research shows the presence in white of egg of two kinds of proteïds, viz. :—

1. Those coagulable by heat; of which two belong to the globulin class, and are precipitable by saturation with magnesium sulphate. Their coagulation temperatures are: oviglobulin α at 57.5° ; oviglobulin β at 67° . There are in addition three members of the albumen class which coagulate at the following temperatures: albumen α at 72° , β at 76° , and γ at 82° .

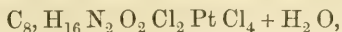
2. Peptones, which increase in amount with the staleness of the egg. Their presence does not influence the coagulation temperature of the other proteïds.

Decomposition products of Casein. E. Drechsel. (*Journ. prakt. Chem.* [2], xxxix. 425-429; *Journ. Chem. Soc.*, October, 1889.) By treating casein with concentrated hydrochloric acid and stannous chloride, Hlasiwetz and Habermann obtained leucine, tyrosine, glutamic acid, aspartic acid, ammonia, and a thick, uncrystallizable liquid; the author treated this liquid with phosphotungstic acid, and obtained a precipitate which was washed with 5 per cent. sulphuric acid, and heated with baryta water; the filtrate, after precipitating the excess of barium, was evaporated with hydrochloric acid. The hydrochloride, $C_7H_{14}N_2O_2Cl_2$, of a strong base was thus obtained; its *platinochloride*,



forms long, reddish-yellow prisms.

When alcoholic platinic chloride was added to the mother-liquor from the above hydrochloride, the *platinochloride*,



of another base, homologous with the above, was obtained.

The author considers that these bases form an important departure in the investigation of the albuminoids.

Nuclein. L. Lieberman. (*Chem. Centr.*, 1889, 540, 541, and 590.) The author now shows that the presence of metaphosphoric acid in nuclein may be proved without preparing the pure substance. If the yolk of hen's egg is treated with dilute hydrochloric acid, and the filtrate added to a clear solution of white of egg, a much heavier precipitate occurs than is produced by the action of hydrochloric acid alone. This precipitate shows all the properties of nuclein.

If an alkaline solution of xanthine is added to a clear solution of white of egg also alkaline, a precipitate is obtained by adding the metaphosphoric acid in excess. After washing with cold water, and treatment with ammonia or boiling water, xanthine may be detected in either solution. Nuclein obtained from yeast behaves exactly like this.

Guanine, dissolved in dilute sodium hydrate, produces first a white flocculent precipitate on the addition of metaphosphoric acid, which becomes crystalline on adding an excess of the precipitate. The flocculent precipitate contains guanine, metaphosphoric acid, and soda, whilst the crystalline precipitate consists of pure guanine. Xanthine and guanine appear, therefore, to be merely mixed with the nuclein. Hypoxanthine, on the other hand, seems to be combined with some other substance, such as adenine or carnine, which accompany nuclein.

Pure Albumen Free from Ash. E. Harnack. (*Pharm. Journ.*, from *Ber. der deutsch. chem. Ges.*, xxii. 3046.) The author has obtained albumen in a high state of purity, which yielded no ash when burnt, and presented some noteworthy characters. It was prepared by repeatedly dissolving and precipitating a metallic albuminate, obtained by treating a solution of a copper salt with a solution of albumen freed from globulin and otherwise as pure as possible. When all trace of phosphate had been removed, the albuminate of copper was decomposed and the albumen obtained free and otherwise unaltered. In this condition it was found not to be coagulated by boiling, and apparently incapable of passing into the coagulated state; it was not precipitable by alcohol,

ether, carbolic acid, or tannin; with pure cold water it thickened and gradually assumed the appearance of a solution, especially upon heating to boiling temperature; from this solution it was precipitated by neutral salt solutions (again soluble on strong dilution) and by acids (insoluble in excess), but not by alkalies; and the albumen did not lose these properties on evaporation of the solution to dryness at 100° C.

Composition of Albumen. E. Harnack. (*Ber. der deutsch. chem. Ges.*, xxiii. 40-43.) The author has determined the amount of sulphur in pure albumen (free from ash), and finds it to amount to 1.91 per cent. As regards the empirical formula of albumen, he regards that suggested by Loewe ($C_{210}H_{330}N_{52}O_{66}S_3$) as the most probable. A comparison of the number of sulphur atoms and the number of carbon atoms in the different albuminoids, according to the present analysis, shows the following relation:—

Egg albumen contains 1 atom of sulphur to 70 of carbon.

Globulin contains 1 atom of sulphur to 146 of carbon.

Hæmoglobin " " " " 350 "

The Toxalbumens. Prof. Cornil. (*Journ. de conn. Méd.*, May 1, 1890. From *Amer. Journ. Pharm.*) According to the author, the toxic action of pathogenetic microbes is not wholly due either to the microbes themselves or the alkaloids they secrete. Christ-mas has found that cultures of staphylococcus pyogenes aureus contain a pyogenic albuminous substance which may be precipitated by alcohol. Hankin precipitated this toxic albumen from cultures of charbon bacilli by the use of ammonia sulphate and alcohol, and found them to possess innoculatory power. Brieger and Fränkel and Roux and Yersin obtained the substance from cultures of the diphtheritic bacillus. It is soluble in water, and may be precipitated by carbonic, acetic, and some of the concentrated mineral acids, by phenol, sulphate of copper, nitrate of silver, bichloride of mercury, the usual reagents for albumen, and the xanthoproteic reagent; while polarization also shows that it is a derivative of albumen. The substance is said to resemble sero-albumen. It is very toxic and conserves its properties after being subjected to a heat of 158° F. Brieger and Fränkel think that the toxalbumens "arise in the organism and develop there at the expense of the albumen of the tissues."

Anthrax Albumose. E. H. Hankin. (*Brit. Med. Journ.*, 1889, 811.) The author reports that he has isolated from anthrax cul-

tures an albumose capable of exercising a marked influence upon the development of the anthrax disease. He states that when this albumose is injected into an animal in too large a quantity, it appears to cause death more quickly than an injection of the most virulent anthrax spores; but that when only a very small dose is injected, the system appears quickly to establish a tolerance of the poison sufficient to protect it against the subsequent action of the anthrax bacillus. The author states that he isolated the albumose from anthrax cultures by the ordinary chemical method of precipitating it from solution by the addition of a large bulk of absolute alcohol, washing the precipitate thoroughly with absolute alcohol to remove ptomaines, drying, redissolving, and then filtering through a Cumberland filter. A rough colorimetric determination of the quantity of the albumose in solution was made by comparing the biuret reaction with that of a peptone solution of known strength.

Ptomaines. A. M. Delèzinier. (*Bull. Soc. Chim.* [3], i. 178-180.) The ptomaine discovered by Brouardel, and described by him as both chemically and physiologically analogous to veratrine (*Moniteur Scient.* [3], x. 1140), has been prepared in quantity by the author. It is an almost colourless oily liquid, having a hawthorn-like odour, and is very prone to oxidation. It is insoluble in water, but soluble in alcohol, ether, and benzol. It appears to be a secondary monamine, $C_{32}H_{31}N$. The analogy to veratrine in its reactions is not observable in the absence of air.

Fever Ptomaines. A. P. Luff. (*Brit. Med. Journ.*, 1889, 193.) The author has isolated an alkaloid from the urine of a typhoid patient, and another from scarlet-fever patients, both of which differ in their reactions from any of the known ptomaines. The quantity obtained in each case was very small.

Crystalline Ethers of Albumose. H. Schrötter. (*Ber. der deutsch. chem. Ges.*, xxii. 1950. From *Pharm. Journ.*) The author has succeeded in preparing relatively well-characterized benzoic ethers of albumose, which are soluble in alcohol, yield no ash, and are quite free from sulphur. The term "albumose" has been applied by Kühne and Chittenden to a group of compounds occurring as intermediate products in the conversion of albumen into peptone. The starting material was a mixture of albumoses obtained by precipitating a weak acetic acid solution of Witte's peptone with a concentrated solution of ammonium sulphate, redissolving the precipitate in dilute acetic acid, and reprecipitating with strong alcohol. The moist precipitate of albumose was dis-

solved in 10 per cent. soda solution, and shaken with benzoyl chloride, and this process was repeated several times. The white powder eventually obtained was extracted with boiling alcohol, which on cooling deposited white microscopic crystals of a body giving the biuret reaction, but containing no sulphur, from which 51.6 per cent. of benzoyl was separated by saponification. Upon distilling off some of the alcoholic mother-liquor a yellow precipitate formed, which, after purification by dissolving it in 95 per cent. alcohol and reprecipitating it by ether, was obtained in white flakes, also free from sulphur, showing the biuret reaction, and yielding on saponification 45.5 per cent. of benzoyl. Upon concentrating the alcohol-ether mother-liquor to a syrup, a crystalline paste formed, consisting of a third body that also gave the biuret reaction, but very faintly; it contained no sulphur, and yielded 61 per cent. of benzoyl on saponification.

Cerebrospinal Fluid. W. D. Halliburton. (*Journ. Physiol.* x. 232-258; *Journ. Chem. Soc.*, August, 1889.) The investigation deals chiefly with the following points:—

1. *Proteids.*—The examination of some 16 specimens of fluid removed from cases of spina bifida and hydrocephalus entirely confirm the statement previously made on this subject, that albumoses are almost constantly present in this liquid. In two cases, true peptone (in Kühne's sense) was also found.

2. *Reducing Substance.*—This is not sugar, it does not undergo the alcoholic fermentation, nor rotate the plane of polarised light, nor give v. Jaksch's phenylhydrazine test. It is not glucosamine nor glycuronic acid, as its reactions do not agree with either of those substances; but it appears to be catechol. In one case this was separated in a crystalline form from the fluid. The crystals gave the characteristic reactions of catechol, but the quantity obtained was too small to admit of an elementary analysis being made.

3. *Salts.*—C. Schmidt made several analyses of hydrocephalus fluid, and remarked on the high percentage of potassium salts present. Subsequent investigators have not, however, confirmed this. In one case in the present research the organic matter was destroyed by fuming nitric acid, and the salts converted into chlorides by hydrochloric acid; the ratio Na Cl : KCl was found to be 95.15 : 4.85, which is about the proportion of sodium to potassium salts in blood and lymph. Ignition was only employed in this experiment to destroy the last traces of organic matter. It is when incineration is performed in the presence of a

large quantity of carbonaceous matter that the danger of salts like sodium chloride being carried off is especially to be feared.

The Identity of Cerebrose and Galactose. H. T. Brown and G. H. Morris. (Abstract of a paper read before the Chemical Society, December 19, 1889. From the Society's Proceedings.) The authors give the results of an examination of a sample of *cerebrose* prepared from phrenosin, which was placed in their hands early in 1888 by Dr. Thudichum, who first isolated and crystallized this substance. They show that its specific rotatory power, cupric reducing power, and molecular weight, as determined by Raoult's method, are identical with those of *galactose*, thus confirming the recent work of Theirfelder, who has proved the sugar produced by the action of acid on cerebrin to be galactose.

Adenine and Hypoxanthine. G. Thoiss. (*Zeitschr. für physiol. Chem.*, xiii. 395-398.) Adenine and hypoxanthine contain a group, $C_5H_4N_4$, called *adenyl*. Adenin ($C_5H_4N_4NH$) is adenyimide; hypoxanthine ($C_5H_4N_4O$) is adeny oxide. The author finds that the hydrogen atom displaceable by alcohol radicles in adenine is situated in the adeny, and not in the imide-group. A description is given of methyl and benzyl derivatives of adenine as well as of the hydrochloride, sulphate, and nitrate of benzyladenine.

Adenine, Guanine, and their Derivatives. S. Schindler. (*Zeitschr. für physiol. Chem.*, xiii. 432-444; *Journ. Chem. Soc.*, August, 1889.) The following method is suggested for the estimation of these substances when contained in a mixture:—

They are dissolved in dilute hydrochloric acid; the solution is made alkaline with ammonia, and precipitated with ammoniacal silver solution. The precipitate is warmed, allowed to cool, collected, and washed with water containing ammonia. It is then treated with nitric acid and carbamide, heated on the water-bath, and filtered. To the filtrate, silver nitrate is added; it is left for twelve hours and filtered. The precipitate is washed free from acid by cold water, then digested with hot ammonia and water; by this means the original silver oxide compounds are obtained again. To this, silver nitrate is again added, the precipitate collected and washed with water, suspended in water, and decomposed with hydrogen sulphide, and some dilute ammonium sulphide. The silver sulphide is filtered off, and the clear filtrate (*a*) contains the whole of the adenine and hypoxanthine, and part of the guanine in solution. The rest of the guanine is mixed with the precipitate, and can be dissolved out from it by hydrochloric acid, and precipitated from this solution by ammonia; this is

collected, and to it is added the guanine in the filtrate (a), which is precipitated therefrom by digestion with ammonia on the water-bath. It is finally dried at 110° and weighed. The filtrate (a), freed from guanine, contains adenine and hypoxanthine, and these are weighed together after evaporation. In the mixture a nitrogen estimation is made, and the relative amounts of the two bases thus calculated. Xanthine can be estimated as xanthinate of silver.

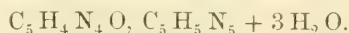
This method gave, in a control experiment, a slight loss of guanine and adenine, and a slight gain of hypoxanthine, which is probably derived from decomposition of the adenine.

Applied to certain animal organs, the results were as follows : the numbers are percentages for the dry organs :—

	Adenine.	Hypoxanthine.	Guanine.	Xanthine.
Ox testis	none	0.281	0.177	0.222
Spermatozoa of carp .	2.278	0.309	none	0.36
Calf's thymus	1.919	0.218	0.071	0.36

Adenine and Hypoxanthine. G. Bruhns. (*Ber. der deutsch. chem. Ges.*, xxiii. 225–229.) The author suggests a quantitative process for the estimation of adenine, which is based on the comparative insolubility of the picrate. Adenine and hypoxanthine are separated from xanthine and guanine in the usual manner by the addition of silver nitrate to the nitric acid solution. The mixture of adenine silver nitrate and hypoxanthine silver nitrate is then decomposed (the author obtains good results by employing for this purpose dilute hydrochloric acid in place of hydrogen sulphide), the resulting solution nearly neutralised with sodium carbonate, and a solution of sodium picrate added; after remaining 15 minutes, the precipitate is collected and washed. A correction of 2.2 milligrams must be made for each 100 c.c. of filtrate and wash water. The filtrate is then neutralised with ammonia, and the hypoxanthine precipitated with ammoniacal silver nitrate. No correction need be made for the solubility of hypoxanthine silver nitrate if there is no excess of ammonia in either solution.

The author also shows that adenine and hypoxanthine combine in aqueous solution, forming a crystalline compound, the composition of which corresponds to the formula—



The paper also contains a description of *bromadenine*, a crystal-

line bromo-derivative of adenine corresponding to the formula, $C_5H_4N_5Br$.

Diastatic Ferment in the Liver. M. Kaufmann. (*Compt. rend. Soc. Biol.* [9], i. 600-603.) The author has observed that the bile of various animals possesses in a marked degree the power of converting starch into sugar. He regards this observation as additional evidence in favour of the view that a diastatic ferment is formed by the liver.

Artificial Diastase. C. J. Lintner and F. Eckhardt. (*Journ. prakt. Chem.* [2], xli. 91-96.) The authors doubt the existence of Reychler's artificial diastase (*Year-Book of Pharmacy*, 1889, p. 89). They regard it as most probably identical with the ferment of ungerminated grain, and not as a conversion-product of the gluten. The activity of diastase is not due to bacteria.

The Digestibility of Boiled Milk. R. W. Raudnitz. (*Zeitschr. für physiol. Chem.*, xiv. 1-14.) The author arrives at the following conclusions:—The nitrogen is always better assimilated when the milk is fresh. The lessening of the absorption of nitrogen when the milk is boiled can only be caused by the boiling. Two other possible reasons—(1) the keeping of the milk for several days before it was used; (2) the rebelling of the animal's alimentary canal against a diet composed solely of milk—are excluded by counter experiments, for details of which the original memoir must be consulted.

With regard to the fat, boiling makes, apparently, little or no difference.

Influence of Saccharin on Digestion. M. Stift. (*Bied. Centr.*, xviii. 458-460.) Saccharin is found to be incapable of digestion and to pass unchanged through the organism. It has however a decided action on the digestive ferments, delaying the solution of the albuminoids; and as the whole process of digestion consists of a series of ferment-actions, the author is of opinion that saccharin must be regarded as a retarder of digestion, and therefore is injurious to health.

Determination of Free Hydrochloric Acid in the Gastric Juice. M. Boas. (*Chemical News*, from *Zeitschr. für analyt. Chem.*, xxviii. part 5.) The author mixes 5 to 6 drops of the secretion with two or three drops of a solution of 10 grms. of resorcin, 3 grms. of sugar, and 3 c.c. of alcohol in 100 c.c. of water, and evaporates to dryness in a small platinum capsule over a small flame. If hydrochloric acid or some other powerful mineral acid is present, there is produced a fine rose or scarlet surface, which gradually loses

its colour on cooling. This reaction indicates 1–200th per cent. of hydrochloric acid. Organic acids do not produce it. For the quantitative determination, Sjöqvist takes 10 c.c. of the filtered fluids of the stomach, mixes them in a silver or platinum capsule with a slight excess of barium carbonate, and evaporates them to dryness on the water-bath, thus converting the free acids into barium salts. By carbonising the residue and igniting for a few minutes, the organic barium salts are converted into carbonates. The cold char, comminuted as much as possible with a glass rod, is extracted at a boil with 10 c.c. of water, poured on a filter, and washed until the filtrate makes up 50 c.c. In this solution the barium is determined, and shows the proportion of hydrochloric acid originally present. The author has also developed a volumetric method for the same purpose.

Examination of Commercial Peptones. J. König and W. Kisch. (*Zeitschr. für analyt. Chem.*, xxviii. 191–201; *Journ. Chem. Soc.*, August, 1889.) The methods hitherto in use for estimating the soluble and non-coagulable proteids (the albuminoses and peptones) are far from satisfactory. The precipitation of the albuminoses by ferric acetate, with subsequent precipitation of the peptones by sodium phosphotungstate, yields very discordant results. The authors adopt the method of Kühne and Chittenden, precipitation of the albuminoses with a saturated solution of ammonium sulphate, and in another portion the precipitation of both albuminose and peptone by sodium phosphotungstate, and estimation of the peptone from the difference. From 5 to 20 grams of substance (according to the proportion of water it contains) is taken. The insoluble matter and coagulable albumen are separated by filtration and by boiling, and their amount determined. This is preferably effected by Kjeldahl's nitrogen process. Multiplication of the nitrogen found by 6.25 gives the amount of albumen more correctly than direct weighing. The filtrate is made up to 500 c.c.: of this 50 c.c. or 100 c.c. is evaporated to about 10 c.c., and mixed with 100 c.c. of a saturated solution of ammonium sulphate in the cold. The precipitate is filtered off, washed with ammonium sulphate solution, dried, and weighed, and the ammonium sulphate adhering is ascertained by a sulphuric acid determination, and deducted. Of the same filtrate 50 c.c. or 100 c.c. is acidified with sulphuric acid, and precipitated with a strongly acid solution of sodium phosphotungstate. The precipitate is washed with dilute sulphuric acid, and the nitrogen it contains is determined. Although albuminose and peptone con-

tain less nitrogen than albumen, the same multiplier should be used, as this will to some extent compensate for the traces of other nitrogenous substances precipitated at the same time.

Salkowski (*Berlin. Klin. Wochensch.*, 1885, No. 2) gives the following differences between albumin-peptone, gelatin, and gelatin-peptone (a $3\frac{1}{2}$ –5 per cent. solution being used).

	Albumin-peptone.	Gelatin.	Gelatin-peptone.
5 vols. of glacial acetic acid and 5 vols. of sulphuric acid mixed.	violet	yellowish	yellowish.
An equal volume of concentrated sulphuric acid in the cold.	dark-brown	yellow	yellow.
Millon's reagent. Solution boiled with $\frac{1}{4}$ vol. of nitric acid (1·2), then made alkaline with soda.	reddish pp. deep orange	colourless lemon-yellow	colourless. lemon-yellow.

Mucous Fermentation. E. Kramer. (*Monatshefte*, x. 467–505.) Mucous fermentation is the process by which certain solutions of sugars or carbohydrates, such as saccharose, glucose, lactose, mannitol, starch, and mucilage, containing the necessary quantity of albuminoids and mineral salts, are converted into a ropy condition. In the process a mucous substance of the formula $C_6 H_{10} O_5$ is generally formed, simultaneously with variable quantities of mannitol and carbonic anhydride, although in the fermentation of milk the production of all these compounds has not been determined with certainty. The formation of free hydrogen and of lactic and butyric acids in ropy fermentation is due to the use of impure cultures, and is not the result of the mucous ferment, which is a micro-organism belonging to the bacteria. Previously the mucous fermentation was considered to be due to Pasteur's so-named *Micrococcus viscosus* (which, however, does not exist as described by him), but is now shown, in the case of the different solutions investigated, to be the result of the action of at least three totally different micro-organisms. It also appears that no true mucous fermentation is brought about by Prazmowsky's *Ieuconostoc mesenterioides* and *Bacillus polymyxa*, or by Cohn's *Ascococcus Billrothii*.

The solutions of carbohydrates which have been investigated can be classed into three divisions, according to the nature of the ferment capable of producing change in them. The first division

consists of neutral or slightly alkaline solutions containing saccharose, albuminoids, and mineral salts, such as decoctions of barley, of rice and of maize, to which saccharose has been added; and the juice of the carrot, beetroot, and onion. The fermentation is produced by Kramer's *Bacillus viscosus sacchari*, and affects the saccharose. To the second division belong acid solutions (for example, wine) containing the albuminoids and mineral salts and glucose. In these the fermentation is caused by Kramer's *Bacillus viscosus vini*. The third division consists of nearly neutral—acid or alkaline—solutions containing lactose, albuminoids, and mineral salts, such as milk. This class is said by Schmidt-Mülheim to be fermented by a coccus $1\ \mu$ in diameter, and capable also of fermenting mannitol.

The mucous substance of the formula $C_6H_{10}O_5$ may be regarded as "metamorphosed" cellulose. It is precipitated from the fermented liquid by alcohol, by basic lead acetate, and by baryta-water, in the form of a white, insoluble, amorphous, stringy mass, which has a specific rotatory power of $[\alpha]_D = +195$; is not coloured by iodine, and is dissolved by solutions of the caustic alkalis, forming a yellow liquid, from which alcohol precipitates a compound as a white scaly mass. The mucous substance is not to be regarded as being directly produced from the nourishing fluid, but as a secondary product of assimilation of the ferment. Similarly the formation of mannitol is to be attributed to the action of the nascent hydrogen and carbonic anhydride, the primary products of the action of the living organism on the dissolved glucose.

The Chemistry of Saliva. G. Sticker. (*Pharm. Journ.*, 3rd series, xx. 88. From *Apotheker-Zeitung*.) Human saliva is colourless, or presents a somewhat bluish tinge, and has a sweetish or saline taste. The specific gravity varies between 1.002 and 1.008, but under a purely vegetable diet this is lowered. In the evening, and after the different meals, the saliva is heavier than in the morning or when fasting; in the former case, too, it presents an alkaline reaction, but in the latter it reacts faintly acid. With an increased consumption of amylaceous food, the alkali in the saliva increases, but with a pure flesh diet it decreases. Whilst in the horse the quantity of saliva secreted in twenty-four hours will amount to four to six kilograms, it amounts, in grown men, to from 500 to 1,500 grams. In the flesh-eating dog the quantity is still much smaller, since flesh-eaters require less saliva for their food, which is rich in water; the most being required by graminivorous animals for their relatively dry food.

In respect to diastatic power, the saliva of omnivorous man exceeds that of any other creature. In the first two months of an infant's life the diastatic power of the saliva is almost without exception wanting. Occasionally it is present in the saliva of the three months' child, but the more intense action does not become manifest until towards the end of the first year. The toothless child should therefore obtain only liquid nourishment, and have flesh given to it only after the appearance of the incisors and canine teeth. The body temperature of 38° to 39° C. is the most favourable for the saccharifying action of human saliva.

Ptyalin is paralysed by alcohol, and the diastatic action of the saliva is also stopped by large quantities of alkalies or acids. One per cent. solution of carbolic acid in contact with saliva deprives it after a time of the power to decompose starch. A 0.2 per cent. solution of salicylic acid diminishes the salivary fermentation, and a 1 per cent. solution stops it entirely. But it is remarkable that this action is not exercised by the sodium salt of salicylic acid, notwithstanding that it possesses antizymotic properties. A similar action, but to a greater extent, is however shown by salicylic acid upon emulsin, myrosin, and synaptase, whilst pepsin and trypsin can be protected from putrefaction by the addition of salicylic acid without their specific action being injured in the least. Borax does not kill diastase, whilst quinine and arsenious acid paralyse the ferment only in very large doses. Quinine, strychnine, morphine, and curare in small quantities promote the fermentative action of the salivary liquid, in accordance with the known pharmacological axiom that small doses frequently excite while large doses paralyse. A similar behaviour is shown by the pancreas-ptyalin. Sodium chloride solution, up to a strength of 3.85 per cent., promotes the fermentative action of saliva, a higher percentage diminishes it. The same action is shown by sodium sulphate and ammonium chloride, whilst the fermentative action is depressed by ammonium nitrate and potassium chloride. At a temperature of 38° to 40° C. salicin is converted by the salivary ferment into sugar and salicin, but it is not so split up by diastase. Tannin, also, is decomposed into gallic acid and sugar by the diastatic ferment of the saliva, and animal glycogen is converted by it into γ -dextrin and ptyalase.

In respect to the secretion of saliva, it has been found that a temporary diminution of human saliva may be effected artificially by paralysing the nerves of secretion by means of atropine, daturine, cicutine, iodethylstrychnine, and nicotine in large doses.

The agents having a reflex action upon the salivary function, as, for instance, calamus root, absinth, ginger, and black and cayenne peppers, stimulate the secretion; but where these fail, use is made of digitalin, nicotine, aconitine, physostigmine, or pilocarpine. Potassium iodide has also proved effective in stimulating the secretion. Psychic moments, such as the perception of savoury food, or lascivious thoughts, will induce in healthy men an increased flow of saliva. A salivary flow is caused by iodine salts, iodine and allied halogens, gold chloride and nitrate, and copper and lead salts; also by some alkaloids, as nicotine, physostigmine, and pilocarpine, muscarine, as well as by digitalin, sphacelinic acid, and cornutin. It has also been observed in cases of carbolic acid poisoning.

Should the salivary glands become affected in consequence of fever, the saliva will occasionally contain as much as 5 per cent. of albumen, and also in cases of iodism and mercurialism. When there is blood decomposition, as, for instance, the dissolving of the blood corpuscles by arseniuretted hydrogen, frequently the saliva will be sanguineous. In cases of suppression of urine the occurrence of urea in the saliva has been observed. In uræmia ammonium carbonate has been ascertained to be a constituent, and in mercurial salivation valerianic acid appears in small quantities.

The passage of arsenical medicines into the saliva is frequently observed, while iodine and bromine especially find their way into it very rapidly. The interval between the taking of 0.2 gram of potassium iodide, fasting, and the first detection of an iodine reaction in the saliva, varies between nine and twenty-two minutes, and in the urine between nine and nineteen minutes. The metals combined with the halogens iodine and bromine, such as potassium, sodium, or lithium, cannot be detected simultaneously in the saliva. Mercury passes into the saliva only when the system is completely saturated with that metal. Saliva containing iodine or bromine converts starch equally rapidly into dextrin and maltose as when normal; also calomel saliva is not injured as to its saccharifying power. Copaiba balsam can be recognised in the saliva of persons who take it almost immediately. According to the investigations of L'Héritier, the saliva of a healthy person contains 98.65 per cent. of water, 1.26 per cent. of organic matter, and 0.09 per cent. of salts.

Human Bile. S. M. Copeman and W. B. Winston. (*Journ. Physiol.*, x. 213-231; *Journ. Chem. Soc.*, August, 1889.) The bile was obtained from a woman who suffered from obstruction

of the common bile-duct, due to a gall-stone. An external fistula was made by surgical means, and for some months the bile was collected and examined. Otherwise the woman was in perfect health. She died from other causes later. The case was thus an unique one, as in the few previously recorded cases where human bile has been obtained, cancer or other diseases have complicated matters.

The following is a *résumé* of the results obtained:—Calculating from the amount secreted, it is estimated that the normal amount of bile secreted by the liver is about $2\frac{1}{2}$ pints per diem in a man of 12 stone. The rate of flow varies in accordance with the time of ingestion of food, there being usually a rise between one and two hours after a meal. The secretion, moreover, is not a continuous one, the bile being extruded into the gall-bladder by the repeated peristaltic contractions of the bile-ducts.

The colour of the bile in this case was always olive-green; biliverdin, and not bilirubin, being the pigment which was present in greatest quantity.

The quantitative estimation of the solid constituents gave the following results, which may be compared with Frerichs' analysis of normal bile:—

Constituents.	Present case.	Frerichs'.
Sodium Glycocholate } Sodium Taurocholate }	0.6280	9.14
Cholesterin, Lecithin, and Fat .	0.0990	1.18
Mucus.	0.1725 }	2.98
Pigment	0.0725 }	
Inorganic Salts.	0.4510	0.78
Total solids	1.4230	14.08
Water (by difference). . . .	98.5770	85.92
	100.0000	100.00

The low percentage of solids, especially of the bile salts, must be accounted for in the way suggested by Schiff and others, that there is normally a bile circulation going on in the body, a large quantity of the bile salts that pass into the intestine being reabsorbed and again secreted. This view is supported by the fact that cholalic acid is found in very small quantities in the fæces. Such a circulation would obviously be impossible in a case like the present.

Bile from the gall-bladder is always more concentrated than that from a fistula, probably because a portion of the water originally secreted is reabsorbed during its sojourn in the gall-bladder.

Bile is necessary for the assimilation of fats; the fæces contained in this case a large quantity of undigested fat.

Its purgative action is more than doubtful; and although it is able to a small extent to control putrefactive changes, cultivation experiments with various kinds of bacteria show that it is no true antiseptic. The bacteria grew almost as readily in the tubes containing bile as in those which did not.

In this case no bile whatever passed into the intestine, and the fæces remained uncoloured; stercobilin is therefore formed by the reduction by bile pigments in the intestine.

The urine, however, remained coloured with urobilin. Urobilin could not, therefore, have been formed from stercobilin. It is probably formed in the liver itself, together with the bile pigments, by a slight change of metabolism. The liver *post mortem* showed no sign of disease, and was apparently perfectly normal in function, the average amount of urea and uric acid being found in the urine.

Nitrogenous Constituents of Human Urine. E. Schultze. (*Pflüger's Archiv*, xlv. 401-460.) The conclusions arrived at by the author are as follows:—

The urea-nitrogen increases in proportion to total nitrogen as the diet approaches a purely albuminous composition.

The uric acid increases absolutely, but diminishes relatively, both to total nitrogen and to the urea on a meat diet, especially if large quantities of alkaline water be taken and alcoholic drinks and narcotics be avoided.

Reducing Substances in Urine. H. H. Ashdown. (*Brit. Med. Journ.*, 1890, i. 169-172.) The most important substance that reduces an alkaline solution of copper oxide, and that is apt therefore to be mistaken for sugar in urine, is glycuronic acid. It can only be identified with certainty by isolating it and examining its properties. A ready distinction, however, between sugar and this substance is that the addition of yeast to the former, or to its solution in urine, causes the occurrence of alcoholic fermentation, while the same addition to the latter does not.

The urine secreted after drugging with morphine contains not sugar, but glycuronic acid; after the administration of chloroform, glycuronic acid, not sugar, is present. This confirms a

previous investigation of Meyer. The so-called glycosuria of curare poisoning does not depend on the presence of sugar; there is no fermentation with yeast. The quantities of urine obtainable under these circumstances are, however, so small that it was not possible to separate out glycuronic acid. The administration of ether does not cause the appearance of any reducing substance in the urine. After section of the renal nerves, a paralytic secretion occurs; this contains a reducing substance, which was found to be glycuronic acid.

Acetonuria and Diabetic Coma. S. West. (*Medico-Chir. Trans.*, lxxii. 91-110. From *Journ. Chem. Soc.*) A systematic examination of the urine for acetone was made in a number of cases of healthy people, of those suffering from various complaints, and of those suffering from diabetes. The tests employed were le Nobel's or Legal's nitro-prusside test, and Lieben's iodoform reaction. The first was applied to the urine direct, the latter to the distillate from the urine. In addition to these, the red reaction which is given by ferric chloride was sought; whether this is produced by ethyl aceto-acetate, or some allied compound, is at present uncertain. The main results of the investigation were as follows:—Acetone is absent, or almost so, in healthy urine. Acetonuria is common in diabetes without coma, and is not constantly present in cases of diabetic coma. It varies greatly in the same case from time to time, without any evident cause. It stands in no relation to the amount of sugar in the urine, but varies independently of variations in the sugar and specific gravity. It is, moreover, often found in other diseases than diabetes; for instance, in four cases of pneumonia, in one case of cirrhosis of the liver, in one of spinal affection, in one of cerebral hæmorrhage, and in one of delirium tremens.

The iron reaction (? diaceturia), on the other hand, is rare except in cases of diabetes. It may be present when acetone is absent, or absent when acetone is present. They may, however, be both present or both absent at the same time, and neither appears to stand in any definite relation to coma. The presence of acetone in the urine, or the occurrence of the iron reaction is, however, by no means without clinical significance. They indicate defective metabolism, and that the patient is in a worse condition than when the tests applied gave negative results. Acetone and the substance which gives the iron reaction may be by-products in the formation of the at present unknown poison, and their presence often indicates the presence of this poison and the onset

of coma. The occurrence of the iron reaction should be regarded as more serious than that of acetone.

These conclusions confirm in the main those of v. Jaksch (*Acetonuria u. Diaceturie, Berlin, 1885*); the terms acetonæmia and acetonuria are misleading if used as synonymous with diabetic coma.

Test for Albumen in Urine. M. Zouchlos. (*Pharm. Centralhalle, 1890, 353. From Pharm. Journ.*) According to the author a mixture of potassium sulphocyanide and acetic acid is a more delicate test for albumen in urine than the potassium ferrocyanide and acetic acid solution, over which it also has the advantage of being colourless. It is prepared by mixing 10 c.c. of a 10 per cent. solution of potassium sulphocyanide with 2 c.c. of acetic acid. A few drops of this liquid, which can be kept unaltered for a considerable time, added to an albuminous urine, produces a turbidity or a precipitate according to the quantity of albumen present. Potassium sulphocyanide and succinic acid are said to act in a similar manner, and as these can be carried about separately in the dry state, the author suggests that they would be convenient for clinical use; a mixture of the two is apt to deliquesce, but this could be avoided by enclosing it in gelatine capsules.

A New Test for Albumen in Urine. G. Roch. (*Pharm. Centralhalle, 1889, 549.*) The reagent recommended by the author is *salicyl-sulphonic acid*, which produces a white precipitate or turbidity with solutions of albumen. It is applied by adding 5 c.c. of a 20 per cent. solution of the acid to 10 c.c. of the urine to be tested. The test is said to be so delicate that the presence of as little as 0.0005 gram of albumen in 10 c.c. of urine will still produce a visible turbidity.

Volumetric Estimation of Uric Acid. MM. Arthaud and Butte. (*Répertoire de Pharmacie, January 10, 1890.*) The author's process is based upon the insolubility of copper urate. The phosphates are precipitated from the urine by an excess of sodium carbonate. To 20 c.c. of the filtered liquid the cuprous solution is added, drop by drop, from a burette until the precipitation is complete. The reagent is made by dissolving 1.484 gram of cupric sulphate, 20 grams of sodium hyposulphite, and 40 grams of sodio-potassium tartrate in sufficient water to make up 1 litre. 1 c.c. of this solution corresponds to 1 milligram of uric acid.

Estimation of Uric Acid. M. Bayrac. (*Comptes Rendus, February 17, 1890.*) 50 c.c. of the urine are evaporated on the water-bath. The residue is treated with 5 to 10 c.c. of diluted

hydrochloric acid (1 in 5), and the precipitate is washed with alcohol to remove urea and creatinine. It is then dissolved on the water-bath with 20 drops of solution of sodium hydrate, and heated to nearly boiling with 15 c.c. of saturated solution of sodium hypobromite in the usual apparatus for urea estimations. The whole process can be performed under two hours.

Pfeiffer's Test for Latent Gout. W. Roberts. (*Lancet*, 1890, i. 9, 10.) The author has critically examined Pfeiffer's method of detecting uric acid diathesis and tendency to gravel, and finds it to be unreliable and misleading. A simpler and more trustworthy test consists in placing several portions of the urine in corked phials in a warm place (to prevent precipitation of urates), a few drops of chloroform being added to prevent putrefaction. Sooner or later crystals of uric acid are deposited if the urine is acid; the time at which crystals first make their appearance giving an indication of the degree of precipitability of the urine, that is of its proneness to deposition of uric acid. If crystals generally appear in two or three hours, this would indicate a morbid imminence of gravel; if only after twelve or twenty-four hours, the occurrence does not come within the range of pathological significance.

The Estimation of Urea. D. B. Dott. (*Pharm. Journ.*, 3rd series, xx. 793.) The author's modification of the hypobromite method consists in the substitution of a hypochlorite for the hypobromite, and the use of the ordinary nitrometer. The solution of hypochlorite is prepared by mixing one part of chlorinated lime with three of water, and filtering. The nitrometer is now filled with this solution, and a measured quantity of the urine (say 4 c.c.) introduced by the funnel, any small amount adhering to the sides being washed in with a few drops of distilled water. The tube is now turned over twice from its perpendicular position, in order to mix the liquids, and in a few minutes the reaction is complete. It is well to introduce a little baryta solution to make sure that all the carbonic acid is absorbed, and then a few drops of methylated spirit to remove the froth and permit the reading to be accurately made. The results obtained by this method are shown to be accurate and to agree very closely with those obtained by the hypobromite method.

A Simple Method for Estimating Urea. C. W. Heaton and S. A. Vasey. (*Analyst*, June, 1890.) The process recommended by the authors is as follows:—

1. Into the gas generator is poured by means of the funnel one

fluid drachm of bromine washed in by ten fluid drachms of the soda solution. The generator may then be immersed in cold water, and the inverted bottle of water placed over the end of the delivery tube. 2. Two fluid drachms of urine, very carefully measured, are added and washed in by exactly one fluid drachm of water. The three fluid drachms so added will of course cause an equal volume of air to pass into the receiving bottle. The generator is gently shaken; brisk effervescence takes place, and gas equal in volume to the liberated nitrogen is collected in the receiver. The generator should be kept as nearly as possible at the temperature of the air. 3. When the evolution of gas ceases, the receiver is removed from the basin by means of the thumb or a glass plate, and placed mouth upwards on the table. It is now only necessary to measure in minims the quantity of water required to fill it. After deducting 180 (which may be taken as 200) minims due to the air displaced by the urine, each 100 minims of water added represented 0.25 per cent. of urea in the urine examined. If the urine contains more than 3 per cent. of urea, it is best to dilute it with an equal volume of water before making the determination.

The following table gives the percentage of urea corresponding to the volume of gas liberated, as shown by the quantity of water required to fill the bottle:—

Minims of Water required.	Percentage of Urea.
200	0.00
300	0.25
400	0.50
500	0.75
600	1.00
700	1.25
800	1.50
900	1.75
1000	2.00
1100	2.25
1200	2.50
1300	2.75
1400	3.00

Sources of Error in the Estimation of Urea with Sodium Hypobromite. R. Luther. (*Zeitschr. für physiol. Chem.*, xiii. 500-505.) In the estimation of urea by means of sodium hypobromite, a part of the nitrogen remains behind, and does not pass into the collecting tube. Part of this is oxidized to form nitric

acid; another part remains unoxidized, and is present in such a form that on boiling with alkalis it is evolved as ammonia. The first source of error may be avoided by the addition of glucose to the solution of urea, as it reduces nitric acid *in statu nascenti*. But there appears to be no means of preventing the loss of the remainder of the nitrogen. The amount of these losses is found to vary with the concentration and temperature of the solution, as well as with the presence of other substances.

Detection of Nitrous Acid in Saliva. L. I. N. Ilosva. (*Bull. de la Soc. Chim.* [3], ii. 388–391.) The saliva is boiled with an acetic acid solution of sulphanilic acid, the clear solution is decanted, and naphthylamine is added, when a rose coloration indicates the presence of nitrous acid, which is increased after a meal; the action of tobacco smoke retards the reaction considerably.

Detection of Blood Stains. MM. Leone and Denaro. (*Gazz. Chim. Ital.*, xix. 97–99. From *Journ. Chem. Soc.*) Old, decomposed stains, from which water will no longer dissolve out the colouring matter, are treated with a solution of potash or soda. If hæmatin is present, it will pass into solution, and the filtered liquid will appear green in a thin layer, and red in a thick layer. The solution will also contain iron, which may be detected in the ash. The evaporation and ignition for this purpose must be conducted in silver, and not in porcelain, vessels, since the latter give up an appreciable amount of iron.

Estimation of Sugar by Fehling's Solution. H. Causse. (*Bull. de la Soc. Chim.*, i. 625, 626.) The author suggests the addition of 4 c.c. of a 5 per cent. solution of potassium ferrocyanide and 20 c. c. of water to each 10 c.c. of Fehling's solution employed. On adding the sugar solution from a burette to the boiling mixture, the potassium ferrocyanide dissolves the cuprous oxide as quickly as it is precipitated, and forms a colourless solution, thus rendering the exact point of decolorization more easily perceptible and preventing bumping.

The Value of the Phenylhydrazin Test for Sugar. J. A. Hirschl. (*Zeitschr. für physiol. Chem.*, xiv. 377–389; *Journ. Chem. Soc.*, July, 1890.) The author arrives at the conclusion that the phenylhydrazin test is a perfectly trustworthy one. If the urine gives the typical needles of phenylglucosazone, it certainly contains glucose. 0.03 per cent. of sugar in urine, and 0.003 per cent. of sugar in water, can by this means be detected. It is essential that the test-tube should be allowed to remain one hour

in the water-bath. If the result is a yellowish brown, amorphous precipitate, sugar is not present, but the substance which behaves in this way is probably glycuronic acid.

Method for the Estimation of Yolk of Egg. S. Bein. (*Ber. der deutsch. chem. Ges.*, xxiii. 423, 424.) The author's method is based on the fact that two of the chief constituents of yolk of egg, namely, glycerolphosphoric acid and lecithin, both contain phosphoric acid. These compounds may be extracted with ether, the ethereal solution evaporated, and the residue carefully ignited at a low temperature with a fragment of potassium nitrate, and the residual phosphoric acid weighed. Lecithin has been shown to consist of an ether-like compound of neurine and distearyl-glycerolphosphoric acid, having the formula $C_{44}H_{90}NP_2O_9$; and according to Gobley (*Annalen*, lx. 275), yolk of egg contains 1.2 per cent. of glycerolphosphoric acid and 7.2 per cent. of lecithin. Every 1.12902 gram of phosphoric acid found, therefore, represents 100 grams of yolk of egg.

Reaction of Saccharin. (*Répertoire de Pharm.*, October, 1889.) The solution containing saccharin is evaporated in a porcelain dish, and the residue treated with nitric acid. A fragment of caustic potash is added, and one or two drops of 50 per cent. alcohol; the mixture is then heated. If saccharin be present the mixture turns to a violet-blue colour, and then to red. The presence of a half milligram of saccharin may thus be detected.

Test for Sulfonal. M. Wefers-Bettink. (*Apoth. Zeitung*, 1889, 1043.) Sulfonal, if heated strongly with reduced iron in a test-tube, develops a garlic-like odour, forming at the same time ferrous sulphide; after cooling, an excess of hydrochloric acid is added to the contents of the test-tube, which causes the evolution of hydrogen sulphide, recognisable by the odour or blackening of lead acetate paper. The sample of reduced iron should be tested for sulphide, as it often contains traces of it, for which allowance must be made.

Method for Distinguishing Exalgin from Antifebrin and Phenacetin. E. Hirschsohn. (*Pharm. Zeit. für Russland*, 1890, 17.) By means of the following test exalgin (methylacetanilid) may be distinguished from antifebrin and phenacetin:—One grm. of exalgin dissolves completely in 2 c.c. of chloroform in the cold. Antifebrin and phenacetin remain undissolved. The two latter may be distinguished by their behaviour towards bromine water. Antifebrin yields crystalline acetparabromanilide. In the case of phenacetin, no separation is effected. Chloroform may also be

used to detect the presence of 10 per cent. of phenacetin or 20 per cent. of antifebrin in a sample of exalgin.

Tests for the Purity of Phenacetin. S. Lüttke. (*Journ. Soc. Chem. Ind.*, 1890.) The ortho-compound of phenacetin, diamidophenols, and diamidophenetols may occur as impurities in phenacetin. To determine the presence of the ortho-compound, 15 grms. are boiled with 25 grms. of dilute hydrochloric acid. Amidophenetol hydrochloride is formed, which may be separated with caustic soda, and its boiling-point (242.5°) determined. The hydrochloride of amidophenetol gives, with ferric chloride, a blood-red coloration. To detect the presence of diamido-compounds, 0.5 gm. of bleaching powder is ground with hydrochloric acid to a thin paste, and a few centigrms. of powdered phenacetin added. A red coloration indicates the presence of diamido-compounds.

A New Reaction of Phenacetin. E. Ritsert. (*Zeitschr. für analyt. Chem.*, xxviii. part 6.) If phenacetin is dissolved in cold strong sulphuric acid, and a few drops of strong nitric acid are added, the solution at once turns yellow. If more nitric acid is added, a colouring matter of a pure citron yellow separates out.

Test for the Purity of Quinine. E. Hirschsohn. (*Pharm. Zeit. für Russland*, 1890, 1.) In order to test the purity of quinine sulphate, 0.2 gm. of that salt is shaken with 5 c.c. of a mixture of 30 vols. of petroleum ether (sp. gr. 0.680) and 70 vols. of chloroform, and filtered. To the clear filtrate 3 vols. of petroleum ether are added. With pure quinine sulphate the liquid remains clear, whereas in the presence of any other alkaloid an opalescence or precipitate is formed.

Estimation of Quinine in Quinine Tannate. S. Neumann. (*Zeitschr. für analyt. Chem.*, xxviii. 663-668; *Journ. Chem. Soc.* June, 1890.) On examining, by Orrillard's method, some specimens of quinine tannate known to contain 25 to 30 per cent. of the alkaloid, only about 7 to 13 per cent. was found. This results partly from the imperfect extraction by alcohol of the quinine contained in the residue of the evaporation with lime, and partly from the solubility of the alkaloid in the potash employed for precipitation. The following method is proposed for technical purposes; it is stated to give results which are about 3 per cent. above the truth:—2 grams of the powdered tannate are well shaken in a stoppered cylinder with 20-25 c.c. of aqueous potash of specific gravity 1.24. Care must be taken that the tannate does not adhere to the glass. Water is then added to make up to 60-80 c.c., and then 100 c.c. of ether accurately measured. The

cylinder is immediately closed and vigorously shaken. When the two liquids have separated, there must be no solid particles visible in either layer. 50 c.c. of the ethereal layer is taken out with a pipette and evaporated in a weighed beaker, the quinine being finally dried at 100° and weighed. An estimation can be completed in an hour and a half.

Detection of Cocaine in the Presence of Other Bases. K. Mezger. (*Chem. Centr.*, 1890, i. 352; from *Pharm. Zeit.*, xxxiv. 697, 698.) From a hydrochloric acid solution, chromic acid precipitates the *cocaine chromate*, $C_{17}H_{21}NO_4 \cdot H_2CrO_4$, in beautiful, silky, lustrous plates. If 0.05 gram of crystallized cocaine hydrochloride is dissolved in 5 c.c. of water, and five drops of a 5 per cent. solution of chromic acid added, a distinct precipitate is formed as each drop falls into the solution; this, however, immediately dissolves again. If now 1 c.c. of strong hydrochloric acid is added, a heavy, yellow precipitate of the chromate is formed. Of the other alkaloids, ecgonine, sparteine, atropine, caffeine, pilocarpine, codeine, and morphine do not form yellow precipitates with chromic acid or potassium chromate; whereas quinine, quinidine, cinchonidine, cinchonine, hydroquinine, apomorphine, brucine, strychnine, and veratrine form precipitates with 5 per cent. chromic acid if the solutions are neutral, cocaine being the only one which is precipitated only after the addition of hydrochloric acid.

Assay of Crude Cocaine from Peru. E. R. Squibb. (*Zeitschr. für analyt. Chem.*, xxviii. 743, 744; *Journ. Chem. Soc.*, July, 1890.) A moisture estimation is made in the usual way: 2 grams of the sample are then dissolved in 12 c.c. of ether (0.725 sp. gr.), and filtered from insoluble matter, which is washed with ether, dried, and weighed. The ethereal solution, which will amount to about 50 c.c., is shaken with 10 c.c. of normal oxalic acid in a separation bulb. The acid is then run into a second separation bulb, and the ethereal solution is shaken with 10 c.c. of water containing 2 drops of oxalic acid, and then twice with 3 c.c. of water, these aqueous liquids being then added to the acid. The washed ethereal solution is now run into a tared beaker, the bulb is rinsed with 15 c.c. of ether and 2 c.c. of water, all of which is added to the acid solution. After subsiding, the acid layer is run back into the first bulb, and the ether, after twice washing with 3 c.c. of water, is added to the former ethereal solution, and the whole evaporated to obtain the weight of the impurities soluble in ether.

The bulb is once more rinsed with 15 c.c. of ether and 2 c.c. of water, which mixture is added to the acid solution. This is then treated with normal soda, adding 1 drop in excess of neutrality. After shaking and settling, the sodium oxalate is run into the empty bulb, the ether is washed twice with 3 c.c. of water, and run into a tared beaker, taking care that no water accompanies it. The bulb is rinsed with 10 c.c. of ether and 2 c.c. of water. This is added to the oxalate solution with 1 drop more of soda. After vigorous shaking, the aqueous liquor is run away. The ethereal liquid is added to the previous one, and the whole evaporated. The cocaine is dried at 90° and weighed. Recent estimations have given 94 per cent. in the best sorts, and 78 in the worst.

Quantitative Separation of Strychnine and Brucine. J. E. Gerock. (*Journ. de Pharm. et de Chim.*, xx. No. 1.) The alkaloids are precipitated from their hot neutral solution by picric acid; the precipitate is weighed, the brucine picrate contained in it then destroyed by heating with nitric acid, the resulting solution exactly neutralized, and then slightly acidified with a trace of acetic acid, and the strychnine picrate thus precipitated collected and weighed. The difference between the two weights shows the quantity of brucine present in the mixture.

An Attempt to Determine "Emetine" by Alkalimetric Titration. T. P. Blunt. (*Pharm. Journ.*, 3rd series, xx. 809.) The author's experiments show that emetine, in its power of saturating acids, acts as a dyad.

A solution of emetine was prepared containing 0.7 per cent., calculated as 0.69 per cent. of the pure alkaloid. Measured portions of this solution were treated with 10 per cent. carbonate of soda solution until a faint permanent precipitate appeared, then ten more drops of the solution were added and about 10 c.c. of chloroform. The whole was well and repeatedly agitated in a separator; and the chloroform drawn off when quite clear; 10 c.c. more chloroform were then poured into the separator, agitated, and separated as before. The whole of the chloroform was now transferred to a clean separator and well shaken with 5 c.c. decinormal sulphuric acid and 15 c.c. of distilled water; it was drawn off, and the acid liquid decanted into a dish. The chloroform was then returned to the separator, shaken with a little distilled water, drawn off, and the water poured into the dish with the rest of the acid; finally the acid was titrated as usual with 1-50 normal soda. The following results were obtained.

Quantity of Solution taken.	Saturating power of Alkaloid as before.	Alkaloid found.	Alkaloid calculated.
10 c.c.	13.3 c.c.	0.068	0.069
8 c.c.	11.2 c.c.	0.057	0.055

It was found that the process did not work satisfactorily with the wine merely concentrated. The author thinks that it might do better if resort were had to a preliminary purification, such as that described by Braithwaite and Umney (*Year-Book of Pharmacy*, 1889, 395.)

Both ether and chloroform were found by blank experiments to dissolve the caustic alkalies in quantities sufficient to vitiate the subsequent titration, but carbonate of soda seems to be quite insoluble in chloroform.

A Simple Apparatus for Testing Spirit of Nitrous Ether. A. E. Slinn and H. Stubbins. (*Pharm. Journ.*, 3rd series, xx. 181.) The authors give a description and woodcut illustration of a simple and inexpensive apparatus capable of being used in the place of the nitrometer in Allen's method of assaying spirit of nitrous ether. For particulars reference should be made to the original paper.

The Estimation of Ethyl Nitrite in Spirit of Nitrous Ether. J. C. Thresh. (*Pharm. Journ.*, 3rd series, xx. 752.) The author reviews the processes suggested by Eykman, Allen, Dott, and Dunstan and Dymond, and then describes a method of his own which, like the two latter, is based upon the estimation of the iodine liberated by the interaction of the nitrous and hydriodic acids. The disturbing influence of atmospheric and dissolved oxygen is avoided by working in an atmosphere of coal gas, and with reagents free from dissolved oxygen. The process is carried out as follows,—

Take a flask or wide-mouthed bottle capable of holding about 350 c.c., and place in it about 250 c.c. of pure water, add about 2 grms. of potassium iodide, a few drops of starch solution, and 10 c.c. of dilute sulphuric acid. Be provided with a rubber stopper having two perforations, through one of which passes a piece of glass tube, which, by means of a short length of caoutchouc tube, is connected with the gas supply on the bench. Insert the stopper and depress the tube until the end is about half an inch beneath the surface of the liquid in the bottle, and pass a brisk current of gas through for ten minutes. The escaping gas can be ignited

at the end of a piece of glass tube pushed through the second aperture in the stopper. Now remove this tube, after extinguishing the gas, raise the first tube until the end only just projects below the lower surface of the rubber stopper, and introduce into the flask 5 c.c. of the spirit of nitrous ether by means of a pipette with stem sufficiently long to reach to the bottom of the bottle. The pipette should slip easily through the second aperture and yet allow of no escape of gas or vapour. As soon as the pipette is pushed through the stopper the gas must be turned off. Allow the spirit to flow into the flask very slowly, at the same time imparting a gentle rotatory motion to the liquid in the flask. There should be no shaking, no appearance of effervescence, or the results will be too low from loss of the volatile ethyl nitrite. The gas tap must be turned now and again for an instant to relieve the pressure within the bottle and allow the spirit to flow in. The whole of the spirit having been introduced, the pipette is withdrawn and quickly replaced by a glass tube connected by means of india-rubber tubing with a burette charged with standard solution of sodium hyposulphite, which is then run in until the colour of the mixture is discharged. All violent agitation should be avoided; otherwise nitric oxide is evolved and loss of iodine ensues. A gentle rotatory motion is quite sufficient.

A second determination is made by simply introducing another 5 c.c. of the spirit with the same precautions as before, and repeating the titration. If the spirit contain less than 1.5 per cent. of ethyl nitrite a third determination may be made with the same solution.

Each c.c. of volumetric solution used (less 1 per cent. allowed for the action of oxygen contained in the standard solution) corresponds to .075 milligram of Et N O_2 .

No. of c.c. of hyposulphite $\times 1.5$ = grams of ethyl nitrite in 100 c.c. of the spirit.

The results published by the author prove the great accuracy of the method.

Spiritus Ætheris Nitrosi. A Simple Method of Detecting Methylated Preparations. J. Muter. (*Analyst*, March, 1890.) The test consists in putting some of the sample into a glass, with a lump of solid caustic potash (about the size of a small bean), and stirring till nearly dissolved. Real B.P. spirit, made from rectified spirit of B.P. quality, will lose all its odour of nitrous ether, and, after standing for half an hour, will not have become darker than the very palest tint of straw-colour (not visible by

gaslight), and it will then only have the odour of plain rectified spirit. The methylated article, on the other hand, will become of a dark colour, varying from deep yellow to orange red, and will give off the well-known odour of methylated spirit very distinctly.

Detection of Impurities in Alcohol. P. Cazeneuve. (*Journ. de Pharm.* [5], xix. 513-515; *Journ. Chem. Soc.*, September, 1889.) In a previous paper the author published some important reactions for these impurities. Recently Barbet (*Journ. de Pharm.* [5], xix. 494) has written on the same subject, but has not noticed the effect of time and temperature on the reaction between these substances and potassium permanganate. As a standard of comparison the author employs pure alcohol of 93°, and a 1:1000 potassium permanganate solution; 10 c.c. of the standard alcohol at the temperature of the laboratory (15° to 20°) requires five minutes to give with 1 c.c. of permanganate a slightly yellowish rose tint, indicating that the reduction is not quite complete. An ordinary alcohol of 93°, under the same conditions, exercises a much more rapid reducing action, and this increased rate of action indicates impurity. If the test is applied to brandy, for example, it is necessary to compare with the standard alcohol diluted to the same strength. The test may be applied in the laboratory by distilling 500 c.c. over the water-bath. The first 10 c.c. of the distillate is compared with pure alcohol. When the distillation is finished, the last few c.c. in the retort are also tested for impurities of higher boiling point than alcohol.

Estimation of Acetone in Wood Spirit. L. Vignon. (*Comptes Rendus*, cx. 534-536.) In applying Krämer's process, founded on Lieben's iodoform reaction, to the determination of the acetone present in the crude methyl alcohol used for the preparation of methylated spirit, it is necessary to have the iodine present in large excess, and to conduct the operation in the following way: 5 c.c. of the wood spirit are dissolved in 200 c.c. of distilled water, and the volume made up to 250 c.c.; 5 c.c. of this mixture are placed in a stoppered and graduated cylinder with 10 c.c. of binormal soda, and, after shaking, 5 c.c. of binormal iodine are added, and the mixture again shaken; 10 c.c. of ether free from alcohol are then added to take up the iodoform, and the volume of the ethereal solution noted. 5 c.c. of the ethereal solution are taken out with a pipette and evaporated in vacuo, and the iodoform is weighed as soon as possible. Aldehyde, ethyl alcohol, and other bodies capable of furnishing iodoform must be absent.

Estimation of Acetone. E. Arachequesne. (*Comptes Rendus*, cx. 642-644.) Krämer's method (see preceding abstract) for the estimation of acetone, based on Lieben's reaction, was intended only for determinations in methyl alcohol used in the manufacture of methylaniline, containing, at most, 1 per cent. of acetone. With a view to making the method more generally applicable, the author makes the following proposals:—1. That Krämer's method, as it is, should be used only with pure methyl alcohol. 2. When the liquid to be analysed contains 15 to 30 per cent. of acetone, a smaller amount should be employed. For example, with liquids containing 20 to 30 per cent. of acetone, 5 c.c. are diluted with water to 500 c.c., and of the diluted solution 5 c.c. are taken for the analysis, and the result is multiplied by 20. 3. With solutions still richer in acetone, 5 c.c. are diluted with water to 50 c.c. Of this solution, 5 c.c. are put into a 200 c.c. flask, the bottom of which terminates in a point closed with an india-rubber tube and a clamp. Binormal soda (10 c.c.) and binormal iodine solution (5 c.c.) are added, and the whole is well shaken. The addition of the soda and iodine solutions (in the same proportions) is then continued until no more iodoform is precipitated. The iodoform is now washed into a burette, having a plug of asbestos at the bottom, and after the liquid has passed through, it is dissolved in ether and finally weighed, as described by Krämer.

A New Test for Hydrogen Peroxide. M. G. Deniges. (*Chemist and Druggist*, May 31, 1890.) The author finds that if a 10 per cent. aqueous solution of ammonium molybdate is mixed with its own volume of concentrated sulphuric acid, and a few drops of hydrogen peroxide are added to it, an intense yellow coloration is produced.

Detection of Carbon Monoxide in the Air. C. de la Harpe and F. Reverdin. (*Chemical News*, August 30, 1889.) The authors filter the air through slag-wool or cotton, and pass it over pure dry iodic acid at 150° and then into a solution of starch-paste in distilled water. The monoxide is thus oxidized to dioxide, and the iodine liberated produces the usual blue colour with the starch.

Estimation of Sulphuretted Hydrogen in Aqueous Solutions. G. Fauser. (*Chem. Centr.*, 1889, 754, 755.) The solution is delivered to the bottom of a flask containing a known quantity of a solution of bromide; an excess of potassium iodide is then added, and the liberated iodine titrated with sodium thiosulphate.

Schützenberger's Process for the Estimation of the Oxygen in Water. H. E. Roscoe and J. Lunt. (*Pharm. Journ.*, 3rd series, xx. 99.) The authors find that a series of estimations made on the same sample of London tap water give results which differ 35 per cent. from the mean value, and that the time taken in titrating has a great influence, much higher results being obtained if titration be quickly than if it be slowly performed. The disturbing influence has been traced to the fact that when aerated water is introduced into an atmosphere of hydrogen, as in the usual process, it immediately begins to lose oxygen by diffusion, a fact hitherto overlooked. The result of an oxygen estimation thus depends on the degree of exposure to hydrogen during titration, and results between 0.53 and 7.56 were obtained with the same water by varying the exposure. Under favourable circumstances 20 per cent. of the dissolved oxygen diffuses, whilst in the usual form of the apparatus 50 per cent. of the oxygen diffuses during the estimation. An exposure of three minutes is sufficient to permit all the dissolved oxygen to escape. This explains the return of the blue colour during an estimation carried out in the usual manner, the *diffused* oxygen becoming reabsorbed by the reduced indigocarmine. No return of the blue colour takes place on reducing indigocarmine when free oxygen is absent, and the action has been proved to be due to the supernatant gas, and not to any action occurring within the liquid, as Schützenberger supposed. Diffusion also explains the observation made by Schützenberger that twice the amount of oxygen is found when a large amount of reduced indigocarmine is present; in that case the dissolved oxygen is at once acted on, and so cannot diffuse. Ramsay and Williams, who have investigated the process, do not obtain twice the amount, but only an increase in the ratio 3:5. Diffusion also explains this observation; a smaller vessel having been used in their experiments, a larger proportion of the oxygen was found in the usual process; in other words, three-fifths of the whole. The method adopted to eliminate this error, due to diffusion, is to run the aerated water beneath the surface of a liquid containing a measured excess of hyposulphite, and a little reduced indigocarmine as an indicator. In this way the dissolved oxygen is immediately acted on by the hyposulphite and its diffusion prevented. For the standardization of the hyposulphite, the two methods hitherto used were found inaccurate. The copper method is fundamentally wrong owing to a secondary action which occurs between sulphite and dissolved oxygen. The aerated

distilled water method, hitherto used with Bunsen's absorption co-efficients, the authors show to be inaccurate, giving the values obtained by them, which agree closely with observations made by Dittmar. The new method of carrying out the process, and the corrected values for the oxygen dissolved by distilled water, give fairly accurate results. The reaction is much disturbed by the presence of free acid or alkali.

A New Method of Estimating the Oxygen Dissolved in Water.

J. C. Thresh. (Abstract of a paper read before the Chemical Society, January 16, 1890. From the Society's Proceedings.) The process is based on the observation that whereas, in absence of oxygen, nitrous acid and hydrogen iodide interact to form iodine, water, and nitric oxide; in presence of oxygen the nitric oxide becomes re-oxidized, and, serving as a carrier of the oxygen, an amount of iodine equivalent to the oxygen present is liberated, in addition to that resulting from the initial action of the nitrous acid: hence, deducting the amount liberated by the nitrous acid and by the oxygen dissolved in the solutions used from the total amount, the difference will be that corresponding to the oxygen dissolved in the water examined.

The solutions used are: (1) a solution containing .5 gram of sodium nitrite and 20 grams of potassium iodide in 100 c.c.; (2) a solution of 7.75 grams of sodium thiosulphate in 1 litre, 1 c.c. of which corresponds to 0.25 milligram of oxygen; (3) a clear solution of starch; and (4) diluted pure sulphuric acid (1:3).

The apparatus required consists of a wide mouth white glass bottle of about 500 c.c. capacity, provided with a caoutchouc stopper, through which four holes are bored. Through one passes the neck of a cylindrical "separator" funnel of known capacity, and through the second a tube drawn out to a fine point, which is connected by a short length of caoutchouc tubing with the thiosulphate burette; while inlet and exit tubes for coal gas are passed through the third and fourth holes, the exit tube having attached to it a sufficient length of caoutchouc tubing to permit of connection being established between the bottle and the separator when the stopper of the latter is withdrawn.

The separator is filled with the water to be examined, and 1 c.c. of the nitrite-iodide and 1 c.c. of the acid solution are added; if the pipette be held vertically, with its end just below the surface of the water, the solutions flow in a sharply defined column to the lower part of the separator, so that an infinitesimally small quantity (if any) is lost in the water which overflows when the

stopper is inserted. The admixture of the liquids having been effected by inverting the apparatus several times, a sharp current of coal gas is passed into the bottle to displace the air, the escaping gas being allowed to burn at a jet attached to the exit tube. Fifteen minutes after adding the solutions to the water the flame is extinguished, a cork is attached in place of the jet, and is inserted in place of the stopper of the separator, and the water is then allowed to flow into the bottle; the exit tube having been disconnected from the funnel and the gas set fire to, thiosulphate is run in until the colour of the iodine is nearly destroyed; about 1 c.c. of starch is then added from the separator, and the titration is completed. The effect of the nitrite, dilute acid, and starch solutions is readily determined by removing the separator and adding 5 c.c. of each in succession, and then titrating; the effect of the oxygen in the thiosulphate may be allowed for on the assumption that as much oxygen is dissolved in it as distilled water would contain at the same temperature. It appears that there is no advantage in passing the coal gas through alkaline pyrogallol.

The author states that concordant results are easily obtained, and that the results in the case of freshly distilled water closely agree with those recently published by Roscoe and Lunt. Thus:—

Temp.				Thresh.			Roscoe and Lunt.
10°	.	.	.	7.81	.	.	7.77
15°	.	.	.	7.02	.	.	6.96
20°	.	.	.	6.17	.	.	6.22
25°	.	.	.	5.69	.	.	5.60
30°	.	.	.	5.45	.	.	5.43

Volumetric Estimation of Gases Dissolved in Water. O. Pettersson. (*Ber. der deutsch. chem. Ges.*, xxii. 1434–1439; *Journ. Chem. Soc.*, October, 1889.) For the volumetric estimation of gases dissolved in water, the author employs an apparatus, a diagram of which is given, consisting essentially of a glass fractionating flask (A)—the size of which depends on the quantity of gas in the sample to be examined—connected with a graduated burette-shaped tube (B) of about 48 c.c. capacity. B is completely surrounded by a larger glass cylinder (E), through which cold water can be made to circulate, and the upper extremity projects through the cylinder (E), and is provided with a stop-cock (z); the end of B finally becomes wider and serves as a funnel (t), for introducing the reagents. The side tube

of the flask (A) is provided with a bulb at the centre, and is connected by means of india-rubber tubing with a cylindrical vessel (C), of about 250 c.c. capacity. The volume of the whole apparatus (A + B) up to where the cylindrical vessel (C) joins the india-rubber tubing is ascertained to within 0.5 c.c.

In making an analysis, a fresh sample of the water is mixed with dilute sulphuric acid (10 c.c.) and poured into C (*z* being open) until A and B are completely filled; the tubing at the junction with C is then pinched to, and the excess of water poured out. The water in A is then heated, carefully at first, and finally kept in brisk ebullition for ten minutes. At the end of the operation, a rapid stream of cold water is passed through E, C is raised until the water in B and C is at the same level, and the volume of the gaseous mixture is noted, the temperature being indicated by a thermometer placed inside E. The carbonic anhydride is then absorbed by pouring a little soda into the funnel (*t*), and opening the cock (*z*), so that some of the liquid flows into B, and the volume of the oxygen is subsequently ascertained by absorption with an alkaline solution of pyrogallol. The residual gas consists of nitrogen alone, or of nitrogen and methane; in the latter case the funnel (*t*) is filled with water, and the gaseous mixture is passed into a suitable apparatus and analysed in the usual manner.

As soon as the water in B is cooled, the carbonic anhydride is to some extent absorbed again. This error can be eliminated by reading the volume five and ten minutes after turning on the cold water; the difference gives the volume of carbonic anhydride absorbed in the first five minutes.

Experiments showed that the volume of carbonic anhydride found is 8 to 10 per cent. less than the quantity actually present, as the whole cannot be expelled even by the most persistent boiling; if, however, large quantities of sulphuric acid are added, the whole of the gas is driven out.

As the contact of the water in C with the air might, in estimating oxygen and nitrogen, influence the results, the author employed another form of apparatus, in which the atmosphere is completely excluded from the sample. The side tube of the flask, (A) is forked, one limb (*x*) being connected by india-rubber tubing with the vessel C as before, the other (*y*), with a glass cylinder (F), which is connected with a cylindrical reservoir (D). The sample is introduced as before, F having been previously filled with mercury up to the fork, and the limb (*y*) closed with a

pinch-cock. The tubing connecting C with the limb (*x*) is then closed with a pinch-cock close to the fork, *y* is opened and the water in A, and finally also that which has been driven into F, heated to boiling, as before. As sulphuric acid must not be added to the water, only oxygen and nitrogen can be estimated with this apparatus. The results are within 0.1 c.c. per litre.

Detection of Free Chlorine in Hydrochloric Acid. M. Kupfferschlaeger. (*Bull. de la Soc. Chim.* [3], ii. 134-136.) A mixture of four volumes of strong hydrochloric acid and one volume of water ought to have no solvent action on metallic copper. If any copper passes into solution the acid contains free chlorine.

Action of Acids on Litmus. J. E. Marsh. (*Chemical News*, lxiv. 2.) It is shown by experiments with Nordhausen sulphuric acid, glacial acetic acid, anhydrous propionic, butyric, and valeric acids, etc., that the presence of water is necessary for reddening blue litmus. Only nitric acid is an exception, as nitration of the organic material takes place under liberation of water, thus giving rise to the colour.

A Convenient and Delicate Test for Oxides of Nitrogen in Sulphuric Acid. J. H. Wilson. (*Pharm. Journ.*, 3rd series, xx. 541.) The author describes a reaction which he finds superior in delicacy to the tests usually employed for the detection of oxides of nitrogen in sulphuric acid. It is as follows:—If a minute quantity of resorcin, taken up on the point of a penknife, be dropped into a cubic-centimetre of sulphuric acid previously diluted with 5 c.c. of water, a yellow colour is immediately produced if any nitrous compounds are present, which is more or less intense according to the quantity.

Detection of Traces of Nitrous Acid. G. Lunge. (*Zeitschr. für Angewand. Chem.*, 1889, 666, 667.) Hlosva has improved Griess's test by using acetic acid instead of a mineral acid. The colour is more intense, and more rapidly developed. He dissolves (1) 0.5 gram of sulphanilic acid in 150 c.c. of dilute acetic acid, (2) boils 0.1 gram of α -naphthylamine with 20 c.c. of water, pours off the colourless solution, and mixes it with 150 grams of dilute acetic acid. The author prefers to mix these two solutions, thus gaining the advantage of having only a single reagent instead of two, and one which indicates by its colour whether it has become contaminated by nitrous acid derived from the air. The mixture is not affected by light, but should be protected from the air. Should it, however, become coloured by absorption of

nitrous acid, it may be shaken with zinc-dust and filtered: the colourless filtrate is as serviceable as the original reagent. It will detect one part of nitrous acid in 1,000,000,000 parts of water.

A Delicate Test for Nitric Acid. E. Merck. (*Pharm. Zeitung*, 1889, 515.) When a trace of a nitrate is added to a solution of resorcin in strong sulphuric acid, the mixture assumes a beautiful blue coloration, which upon the addition of solution of sodium hydrate changes to pink. The test is stated to be an extremely delicate one. It was first observed by Goeldner with a sample of cocaine hydrochlorate which happened to contain a trace of nitric acid, and was erroneously regarded by him as a cocaine reaction.

Estimation of Nitric Acid by Ferrous Sulphate. M. Bailhache. (*Comptes Rendus*, cviii. 1122-1124.) The author prefers ferrous sulphate to ferrous chloride, because there is no danger of volatilization of the ferric salt. The liquid also boils at a higher temperature, and expulsion of the nitrogen oxides is easier. Full details of the method are given, for which the original paper should be consulted.

Influence of Iron on the Gravimetric Estimation of Sulphuric Acid. P. Jannasch and T. W. Richards. (*Journ. prakt. Chem.* [2], xxxix. 321-334.) The loss which is well known to occur in the presence of iron (especially in the ferric state) in sulphuric acid estimations as barium sulphate, is shown by the author to be attributable to the precipitation of the iron as a double sulphate of iron and barium, and the decomposition of this compound with a loss of sulphuric acid during ignition.

Volumetric Estimation of Sulphuric Acid. A. Gawalowski. (*Zeitschr. für analyt. Chem.*, xxix. 19.) The author re-affirms the accuracy of his method, which had been disputed (*Year-Book of Pharmacy*, 1889, 123).

Detection and Estimation of Sodium in Lithium Carbonate. W. H. Symons. (*Chemist and Druggist*, xxxvi. 153, 291.) The author's method is based upon the comparative insolubility of sodium chloride in strong hydrochloric acid, in which lithium chloride is readily soluble. If a mixture of the two carbonates be treated with 10 parts of strong hydrochloric acid, the lithium salt will pass into solution, while sodium chloride will be separated as a crystalline precipitate. The presence of 2 to 3 per cent. of sodium salt may thus be detected. Advantage may be taken of the great difference in the solubility of sodium carbonate as com-

pared with lithium carbonate for increasing the delicacy of the test. For this purpose sodium carbonate is washed out from the lithium salt with cold water on a filter, and the test applied to the residue left on evaporation of the filtrate.

For a quantitative separation, the hydrochloric acid should be previously saturated with sodium chloride.

Separation of Barium and Strontium. R. Fresenius. (*Chemical News*, January 31, 1890.) H. Rose founded a process for the separation of both bases upon the fact (ascertained by himself) that strontium sulphate, even at common temperatures, is gradually but completely converted into strontium carbonate by a solution of ammonium carbonate, whilst barium sulphate, on similar treatment, remains unaltered. If the conversion of strontium sulphate is to be effected rapidly, Rose recommends that the sulphates should be boiled with a solution of potassium carbonate to which a third, or rather more, of potassium sulphate has been added, boiling for about ten minutes.

Rose gives the preference to this method of separation.

To this process P. Schweitzer objects, saying, that though barium sulphate, when existing alone, is not affected by ammonium carbonate, it is converted into barium carbonate if it co-exists with strontium sulphate in large quantity. On the other hand, strontium sulphate, if existing alone, is readily converted by ammonium carbonate, but undergoes no change if it is mixed with much barium sulphate.

These communications by Schweitzer are in direct contradiction with the statements of H. Rose.

A number of experiments showed that neither an excess of solution of ammonium carbonate, nor a prolongation of the time of action, nor an alteration of the degree of concentration, led to satisfactory results. All the experiments confirmed the view of Schweitzer, that barium and strontium sulphates, when mixed, behave quite differently from what would be assumed from the behaviour of the separate sulphates with ammonium carbonate. If barium sulphate predominates, strontium sulphate escapes decomposition; and if strontium sulphate exists in excess, barium sulphate is converted into carbonate. Both reactions occur more or less simultaneously, and sometimes the errors arising may happen to compensate each other.

Experiments were also made on the application of a mixture of potassium carbonate and sulphate. Here also satisfactory results could not be obtained by any modification of the process. Thus a

trustworthy separation of barium and strontium cannot be effected in this manner.

Analysis of Aluminium Sulphate. F. Beilstein and T. Grosset. (*Chem. Centr.*, 1889, ii. 60.) A strong solution of the sample is well mixed with an equal volume of cold saturated solution of ammonium sulphate and subsequently, after long continued stirring, with a large proportion of strong alcohol. The whole of the aluminium sulphate is thus precipitated as ammonia alum. The precipitate is collected and washed with alcohol. The filtrate contains the whole of the free acid which is estimated by titration.

Volumetric Assay of Reduced Iron. A. Partheil. (*Apotheker Zeitung*, 1890, 55.) 1 gram of the sample is dissolved in a 200 c.c. flask with 40-50 c.c. of dilute sulphuric acid (1 : 5). Potassium permanganate solution is now added drop by drop until the solution is just coloured, any slight excess being reduced by the addition of a minute quantity of sugar. The solution is now made up to 200 c.c. by the addition of water. 50 c.c. of this solution (= 0.25 gram of reduced iron) are placed in a flask, a solution of two grains of potassium iodide in water, and a few c.c. of hydrochloric acid added, and the flask corked; after standing for one hour, the liberated iodine is titrated with $\frac{n}{10}$ solution of sodium thiosulphate, adding a little starch solution towards the end of the titration. The number of c.c. thiosulphate required, multiplied by 0.0056, will give the amount of total iron (metallic iron and magnetic oxide of iron). The percentage of metallic iron may be obtained directly by multiplying the c.c. of thiosulphate solution used by 8.12, and subtracting 262.5.

Volumetric Assay of Reduced Iron. H. D. Fuge. (*Pharm. Journ.*, 3rd series, xx. 1053.) The author's method depends on the facility with which iron displaces copper from solutions of its salts. A hot aqueous solution of 1 gram of crystallized copper sulphate in about 25 c.c. of water is poured upon .3 to .4 of reduced iron; the containing flask is immediately corked, and agitated occasionally during ten minutes.

The liquid is then filtered, the residue washed with distilled water, the filtrate acidified with sulphuric acid, diluted with distilled water, and titrated with either potassium bichromate or potassium permanganate.

Quantitative Separation of Arsenic and Antimony. O. Koehler. (*Archiv der Pharm.* [3], xxvii. 406-409.) From a hot solution of arsenic and antimony in concentrated hydrochloric acid, sul-

phuretted hydrogen precipitates the arsenic completely, whilst the antimony remains in solution, provided the acid is present in sufficient excess,—say two parts of concentrated acid to one part of antimonious chloride. The precipitated arsenious sulphide is filtered through a paper moistened with hydrochloric acid, and washed with dilute hydrochloric acid (1 : 3), and finally with water. The earlier use of water would precipitate antimony either as sulphide or oxychloride. The arsenic precipitate is then oxidized with bromine-water and precipitated with magnesium solution.

Test for Arsenic. G. Loeff. (*Apotheker Zeitung*, 1890, 263.) The precipitation of metallic arsenic from arsenical solutions by means of hypophosphites forms the basis of the author's test. 5 c.c. of the solution to be tested, when warmed in a water-bath for one to two hours with 0.2 gram of either sodium or calcium hypophosphite and 10 c.c. of pure concentrated hydrochloric acid, are stated to show the presence of $\frac{1}{50}$ milligram of arsenic. For the detection of arsenic in antimony sulphide, the latter is dissolved in hydrochloric acid with the aid of a little potassium chlorate before adding the hypophosphite and warming. In order to apply the test to subnitrate of bismuth, this salt must first be ignited to expel the nitric acid.

The reaction is said to rank in delicacy between the tests of Gutzeit and Bettendorf.

Volumetric Estimation of Zinc. A. Voigt. (*Zeit. ang. Chem.*, 1889, 307, 308.) The solution of the substance in hydrochloric acid is oxidized with nitric acid and diluted to about 100 c.c. Sufficient potassium tartrate to keep the iron in solution is added, and then ammonia to feeble alkalinity, and the liquid is further diluted to about 250 c.c. Standard solution of potassium ferrocyanide is then run in, until a drop of the mixture brought in contact with strong acetic acid develops a permanent blue. The ferrocyanide is of suitable strength if 1 c.c. is equal to 0.01 gram of zinc. About 46 grams of the salt are dissolved to make a litre, and the solution is standardised against one of zinc made by dissolving 12.461 grams of zinc oxide in hydrochloric acid and diluting to a litre; 10 c.c. of this solution, when mixed with 5 grams of potassium tartrate, a few drops of ferric chloride, ammonia, and sufficient water to make up 250 c.c., should require 10 c.c. of the ferrocyanide. An essential condition is that the excess of ammonia should be as small as possible. Incorrect results are obtained when much manganese is present; lead is not injurious. The process is more rapid than Schaffner's.

Qualitative Analysis of the Ammonium Sulphide Precipitate.

F. Mayer. (*Ber. der deutsch. chem. Ges.*, xxii. 2627–2630.) In precipitating iron and alumina from the hydrochloric acid solution of the ammonium sulphide precipitate by boiling with sodium acetate, chromium, if also present is sometimes partly and sometimes wholly precipitated at the same time. In the absence of iron the chromium remains wholly in the filtrate. Finding that the presence of a very large proportion of iron ensures the complete precipitation of the chromium, the author recommends the addition of ferric chloride (if iron be not already present in large quantity) before boiling with sodium acetate, whenever chromium is suspected to occur in the mixture.

Detection of Mercury. A. Johnstone. (*Chemical News*, lx. 221, 222.) To confirm the presence of mercury in a metallic sublimate obtained by heating a mineral, either with or without fusion mixture, in a tube closed at one end, two drops of strong nitric acid are added to the contents of the tube after heating, then a drop of strong solution of potassium iodide; the bottom of the tube is again heated, when the iodine volatilises and forms the characteristic red iodide with the mercury present in the sublimate. If arsenic and antimony iodides are also present, they may be destroyed by continuing the heating of the bottom of the tube gently, as the fumes of nitric acid decompose them more readily than the mercuric iodide. Another plan is to hold a small piece of gold leaf in the tube, so as to catch the mercury as it volatilises, then moisten the leaf with concentrated nitric acid, and add potassium iodide; even a minute quantity of mercury will give the reaction.

Qualitative Separation of Copper from Cadmium. J. H. Kastle. (*Amer. Chem. Journ.*, xi. 503, 504.) The author prefers the separation of copper by means of metallic iron to the usual method. The ammoniacal solution containing the two metals is acidified with nitric acid and evaporated to dryness, the residue ignited to decompose the nitrates, and dissolved with the aid of a few drops of hydrochloric acid. The filtered solution is digested in a test-tube with iron wire at about 80° C. The copper is thus precipitated as a red deposit on the iron, and cadmium, if present, may be detected in the colourless solution by the yellow precipitate which it gives with sulphuretted hydrogen.

A Delicate Test for Copper. H. Thoms. (*Pharm. Central-halle*, 1890, 32.) The author's test is based on the liberation of iodine from iodide of potassium by cupric salts, and the conse-

quent production of a yellow coloration. The iodine liberated by a solution of cupric sulphate containing only 1 part in 500,000 could still be recognised by the addition of mucilage of starch.

The Chromate Test for Lead in Water. S. Harvey. (*Analyst*, April, 1890.) The author confirms his previous statements respecting the extreme delicacy of this test, and recommends the following mode of operation:—

About half a litre of the water in question is placed in a conical precipitating jar, about two grains of $K_2Cr_2O_7$ are added, and dissolved by agitation. The mixture is set alongside another jar containing "lead-free" water treated in a similar manner. If the water is not quite clear, it must be carefully filtered to render it so before applying the test; the addition of any acid is objectionable, and previous concentration is unnecessary and even injurious. The use of the bichromate in *crystals* is also essential.

Water containing as little as one-fiftieth of a grain of lead per gallon will, when thus treated, become sensibly turbid in about fifteen minutes, and the turbidity is rendered the more apparent by contrast with the jar alongside.

Estimation of Organic Nitrogen in Natural Waters by the Kjeldahl Method. T. M. Drown and H. Martin. (*Chemical News*, lix. 272-276.) 500 c.c. of the water is boiled in a round-bottomed, long-necked, 900 c.c. flask until 200 c.c. have distilled off, the "free ammonia" may be determined in this distillate. When cool, 10 c.c. of pure concentrated sulphuric acid are added, and the remainder of the water is boiled off cautiously; pulverised permanganate is now added, and then 200 c.c. of water free from ammonia. 100 c.c. of a solution containing 200 grams of sodium hydrate per litre, which has been boiled with some permanganate, is run in, the flask adjusted to a tin-tube condenser, well shaken, and the distillation proceeded with. Nesslerising is preferred by the authors to titration. Nitrates and nitrites have not been found to interfere with the accurate determination of organic nitrogen in these waters. Satisfactory results are stated to have been obtained with various waters, even in the presence of added nitrates and nitrites.

Estimation of Organic Nitrogen in Water by the Kjeldahl Process. H. Leffmann and W. Beam. (*Amer. Chem. Journ.*, xi. 274-277.) The authors give an abstract of Drown and Martin's application of Kjeldahl's method of water analysis (*Chem. News*, lix. 272.) They object to the preliminary determination of the free ammonia by distilling the water, on the ground that organic

matter may be destroyed by the boiling and nitrogen be lost. They recommend that the free ammonia be determined in the original water by first precipitating the calcium and magnesium with sodium carbonate and hydrate, and then filtering and Nesslerising. To avoid the loss which is liable to occur in distilling off the ammonia resulting from the action of sulphuric acid and potassium permanganate on the water, the flask containing the green liquid, after addition of the permanganate, is heated until the green colour disappears, diluted, made alkaline with sodium hydroxide, some sodium carbonate added and allowed to settle. The clearer liquid is then filtered, and an aliquot part Nesslerised.

Estimation of Chlorine in Water by Titration. A. Hazen. (*Amer. Chem. Journ.*, xi. 409-414.) An appreciable excess of silver nitrate is always required in this titration to produce a visible coloration with the chromate. This excess is smaller the greater the amount of chromate used, but it is also found to vary with other conditions. As a correction for this the author proposes the use of a silver solution one per cent. stronger than its normal value. He considers it still better to standardise the silver solution against a solution of sodium chloride, and to make a correction for the volume of liquid titrated.

Determination of the Hardness of Water. E. Waller. (*Analyst*, xiv. 108-112.) Attention is directed to the fact that in cases where, either from excessive hardness or from the presence of magnesium salts, it is necessary to dilute a water before applying the soap test, the results may vary widely according to the degree of dilution employed, especially if no deduction is made for the soap required to give a lather with pure water. The hardness of a mixture of calcium and magnesium solutions appears to be less than that of either of the individual solutions apart.

Determination of Hardness in Water. A. H. Allen. (*Journ. Soc. Chem. Ind.*, vii. 795-806.) The author publishes a number of analyses of special waters, the results of which furnish the strongest proofs of the untrustworthy nature of the soap test, especially in the case of very hard waters or of waters rich in magnesia. In such cases the soap test must be abandoned in favour of other methods which furnish the information required more accurately, such for instance as boiling down the water to a small bulk with sodium carbonate, filtering, and washing the precipitate, dissolving it in standard acid, and titrating back with

standard alkali and methyl-orange. The result represents the total calcium and magnesium very closely, and may be expressed in terms of calcium carbonate. By titrating the original water with standard acid and methyl-orange, an estimate of the earthy carbonates (temporary hardness) can be obtained in a few minutes.

Analysis of Water for Domestic Purposes. F. Fischer. (*Zeitschr. für Angewand. Chem.*, No. 18, 1889.) After criticising adversely the germ-counting process, the author deals with the limits of impurity proposed by various authorities, as embodied in the following table:—

Grains per Gallon.	Reichart, 1872.	Fischer, 1873, for Hanover.	Tieman, 1874.	English Com- mission, 1874.	Brussels Con- gress, 1885.	Swiss Society, 1888.	Tieman and Gärtner, 1889.
Organic matter as $K_2M_2O_7$ including	·14-·70	·56-1·02	4·2-7·0	—	·70	·70	·42-·70
Org. Carbon	—	—	—	1·40	—	—	·35
Org. Nitrogen	—	—	—	·021	—	—	—
Albuminoid							
Ammonia . .	—	—	—	—	·007	·0035	·014
Ammonia . .	—	0	0	—	·035	·0014	0
Nitrous Acid .	—	0	0	—	—	0	0
Nitric Acid . .	·28	1·89	3·5-10·5	—	·14	1·40	·35-1·05
Chlorine . . .	·14-·56	2·42	1·40-2·10	—	·56	1·40	1·40-2·10
Sulphuric Anhy- dride	·14-4·41	5·60	5·60-7·0	—	4·20	—	5·60-7·00
Residue . . .	7-35	—	35·0	—	35·0	35·0	35·0
Hardness. . .	12·6	11·9-14·0	12·6-14·0	—	16·0	—	12·6-14·0

While fully admitting the value of these figures, the author cautions against their thoughtless application. In judging of the fitness of a water for domestic purposes, the source of supply and its surroundings should be taken into proper consideration, as well as the results of the chemical analysis and microscopical examination.

Note on "A Digestive Extract of Tea." P. Boa. (*Pharm. Journ.*, 3rd series, xx. 572.) The author has examined a sample of a preparation sold under this name, and found it to be a powdered extract of tea mixed with sugar and gelatine.

Detection of Alkanet Red in Wine. J. Herz. (*Zeitschr. für analyt. Chem.*, xxviii. 637.) The sample of wine to be tested is shaken with amyl alcohol, the latter separated, mixed with a few

drops of olive oil or oil of almonds, and evaporated on the water-bath until all the alcohol is expelled. In the presence of alkanet red, the oily residue, after washing with water, will show a fine red colour, which, on saponification changes to blue or green.

Alum in Bread. G. Bruylants. (*Journ. de Pharm. et de Chim.*, xix. 421.) The author attributes the bleaching action of alum on the paste of bread to the sulphuric acid liberated by the formation of aluminium albuminate. He also finds that the gastric digestion effects the solution of the whole of the alumina introduced into the bread as alum.

Analysis of Pepper and the Occurrence of Piperidine in the same. W. Johnstone. (*Analyst*, xiv. 41-49.)

Moisture and Ash.—A weighed portion is dried at 100° and then incinerated in a muffle. The ash is treated successively with water and hydrochloric acid, and the amount of insoluble matter noted.

Oil.—20 grams are distilled with water; the distillate is shaken with ether, the ethereal solution is evaporated at a very low temperature, and the residue is dried over sulphuric acid.

Piperidine.—20 grams are distilled as for the oil determination, and the distillate is titrated with N/10 sulphuric acid. That the piperidine is not derived from the hydrolysis of piperine is shown by the fact that pure piperine yields no piperidine when distilled with water, also that in distilling pepper with water, piperidine soon ceases to come over, although the amount obtained is very small in comparison with the piperine present.

Piperine.—10 grams are digested at 100° in a closed bottle with 3 grams of potash dissolved in 25 c.c. of water and 25 c.c. of alcohol. The bottle (4 oz.) should have the neck ground flat and be closed by a plate of caoutchouc pressed tightly upon it by a screw-frame. After four to six hours' digestion, the bottle is cooled, the contents are washed into a large flask, and distilled as long as the distillate is alkaline. The theoretical yield of piperidine is obtained.

Crude Fibre.—A small quantity is boiled for half an hour in a flask with inverted condenser with 200 c.c. of dilute sulphuric acid (12.5 grams per litre). The residue is twice boiled with water, then with 200 c.c. of potash (12.5 grams per litre), and again twice with water. It is collected on a tared filter, dried and weighed, and any ash it contains deducted.

Nitrogen.—Determined by soda-lime, as usual.

Alcoholic Extract.—10 grams are extracted with alcohol of 95

per cent. in a Soxhlet's apparatus for twenty-four hours. The alcohol is distilled off, and the extractive matters dried at 100°.

Starch.—The exhausted residue from the preceding is, without drying, washed into a flask with 200 c.c. of water and 20 c.c. of hydrochloric acid (1.121), and heated in boiling water for three hours. After cooling, the liquid is filtered, neutralized with soda, made up to 500 c.c., and titrated with Fehling's solution.

In 13 genuine samples from various localities, the moisture ranged from 12 to 15 per cent.; ash, 1.07 to 4.46 (long pepper, 7.57); oil, 0.53 to 1.87; piperidine, 0.21 to 0.77; piperine, 5.21 to 13.03; fibre, 4.2 to 15.05; starch, 29.6 to 53.5; ash insoluble in acid, 0.06 to 0.62 (long pepper, 1.47). Any larger amount of insoluble ash would probably be the best indication of a fraudulent addition.

Estimation of Fat in Milk. H. D. Richmond. (*Analyst*, xiv. 121-130. From *Journ. Chem. Soc.*) Of the 15 or more methods which have been proposed for the extraction of the fat from the dry residue of milk, those of Adams (paper coil), Soxhlet (plaster of Paris), and Storch (pumice) give the highest and most concordant, but yet not identical results. The author has reinvestigated these three methods, using kieselguhr in place of pumice. In Adams' method, some analysts extract the paper coils with ether for a short time before using them; others apply a correction based on blank experiments with the same batch of paper. The author finds that the complete extraction of the paper with ether requires a very prolonged treatment; the total extract in $7\frac{1}{2}$ hours being more than three times as much as that obtained in the first $1\frac{1}{2}$ hours. The matter extracted consists chiefly of the calcium salt of a resinous acid. The most complete and rapid extraction is obtained by the use of alcohol containing 10 per cent. of acetic acid. After three or four hours' treatment with this reagent in a Soxhlet's apparatus, nothing soluble in ether remains. With the plaster and kieselguhr methods, the chief requisite is to grind the dried residue to a very fine powder, and to extract it with ether for at least three hours. Working in this way, the three methods agree closely. From the results of numerous determinations by the three methods, the author has developed a new formula for deducing the percentage of fat from that of total solids and the specific gravity: $T = 1.17 F - 0.263 \frac{G}{D}$ (apparently a misprint for $+ 0.263 \frac{G}{D}$), where T is the percentage of total solids, F that of

fat, D is the specific gravity of the milk, and $G = 1000 (D - 1)$. This formula gives results which do not differ materially from those of Hehner and Richmond's older formula (*Analyst*, xiii. 32). The most satisfactory method of estimating the total solids appears to be the evaporation of not more than 2 grams of milk in a flat-bottomed basin and drying for 1 or $1\frac{1}{2}$ hours.

Detection and Estimation of Sodium Bicarbonate in Milk. L. Padé. (*Comptes Rendus*, cix. 154-156.) The ash of 10 c.c. of unadulterated milk is found to require but one drop of decinormal sulphuric acid to produce acid reaction. The ash is therefore practically neutral. An addition of alkaline carbonate or bicarbonate would consequently be recognisable by a corresponding alkalinity of the ash. For quantitative estimations, however, it is necessary to bear in mind that a portion of the carbonate added to the milk will act upon the calcium phosphate present, causing the formation of sodium phosphate and calcium carbonate. It is necessary, therefore, for the purpose of such estimations, to determine the phosphoric acid in the ash as well as the alkalinity. The following process is recommended:—

The ash of 25 c.c. of milk is neutralized with decinormal sulphuric acid, and the number of c.c. required, multiplied by 0.0336, gives the percentage amount of sodium bicarbonate which has not been converted into phosphate. The neutralized liquid is mixed with about 2 c.c. of a solution of sodium acetate containing acetic acid, and the phosphoric acid is determined by uranium solution in the usual way. If the uranium solution is made equivalent to a solution of 3.11 grams of sodium ammonium phosphate per litre, each cubic-centimetre of uranium solution corresponds to 0.01 gram of sodium bicarbonate in 100 c.c. of milk, assuming that the ash of 25 c.c. is being titrated.

Composition of Milk produced on English Dairy Farms. P. Vieth. (*Journ. Royal Agr. Soc.* [2], xxv. 180-202.) This paper contains the results of analyses of upwards of 84,746 samples of milk made between 1881 and 1888. The non-fatty solids are found to contain, with little variation, six-twelfth parts of milk-sugar, one-twelfth part ash, and five-twelfths proteids, rather more than two-thirds of the latter being casein. The results are shown in curves, the most striking features of which are the great uniformity of the non-fatty solids and the rather large variations in the percentages of fat which cause the total solids to fluctuate to about the same extent. The best milk is obtained in November, when most cows give a limited amount; in the spring months

there is an increased flow of milk of a poorer quality. The composition of morning and evening milk is also shown in diagrams: the evening milk is almost invariably the richer, and this difference is ascribed to the inequality of the intervals between the two milkings.

Volatile Fatty Acids of Butter. P. Spallanzani. (*Chem. Centr.*, 1889, ii. 339–341.) The author has carried out an investigation into the cause of butter fat containing so variable a quantity of volatile fatty acids. The amount of these acids, expressed in terms of c.c. of decinormal alkali per 5 grams of butter fat, varied from 20.63 to 30.60. The butter from cows stationed at high-lying places contained usually more volatile fatty acids than that from low-lying stations. The butter from different breeds of cows also showed considerable variations. With regard to the influence of length of time since calving, the percentage of fatty acids was found to decline as this period advanced.

Examination of Butter. S. Salvatori. (*Bied. Centr.*, xviii. 788.) Dronot's method for examining butter consists in melting it slowly; if the butter is pure, a clear liquid is obtained, the water and casein settling at the bottom; an artificial butter, on the other hand, remains turbid, and only becomes clear when heated much above its melting point. The author finds that the method is not always trustworthy, inasmuch as purified natural fats of all kinds, oleomargarin, and frequently natural butter, give very clear liquids, natural butter being further characterized by a sediment; the latter, in artificial butters, is amorphous, and renders the liquid turbid as it settles slowly. Some melted samples of natural butter were also turbid, from the presence of drops of water. When natural is mixed with artificial butter, the addition of margarin or fat cannot be established with certainty.

Test for Cotton-seed Oil in Lard. F. P. Perkins. (*Analyst*, March, 1890.) The author finds that if a little powdered potassium bichromate—about .02 to 0.3 gramme—be mixed with a few drops of concentrated sulphuric acid in a porcelain dish, and a small portion—about .5 gramme—of the suspected sample be then introduced, on stirring well a second time, adding water, and stirring again, there will, in the presence of cotton-seed oil, be developed a green colour, due to the change of chromic acid to chromic oxide; but if the vegetable oil be absent, the yellow colour of the dichromate will still prevail. The colour should not be judged until water has been added, and the mixture stirred for some seconds.

Examination of Lard for Adulteration. T. S. Gladding. (*Analyst*, xiv. 32-34.) The following tests should all be applied to a suspected sample :—(1) Specific gravity at 100°; (2) Hübl's iodine test; (3) Bechi-Millian test; (4) Dalican's "titre" test; (5) Belden's microscopic test for beef fat (*Analyst*, xiii. 70). Dalican's "titre" is the temperature of crystallization of the fatty acids. These are to be prepared from the sample by saponification, washed well with hot water, and filtered through dry paper into a test-tube. The crystallizing point is then taken with a thermometer graduated to tenths of a degree. The titre of lard may range from 36·4° to 41·4°; iodine absorption from 57 to 68·4 per cent., a high titre being associated with a low iodine absorption, and *vice versa*. The titre of beef fat is about 41·6 to 44; iodine absorption, 43·8 to 40; that of cotton-seed oil, 33·3, iodine absorption, 108. The one adulterant will therefore, to some extent, mask the other; they are, however, respectively revealed by Bechi's and Belden's tests. The high specific gravity of cotton-seed oil affords the only means of estimating the amount of it present.

Analysis of Fats and Oils. J. Muter and L. de Koningh. (*Analyst*, xiv. 61-65.) The authors' object has been to redetermine the iodine absorption (Hübl's) of the liquid fatty acids from various oils and fats under conditions which should be as uniform as possible, and should exclude any alteration of the acids either by exposure to air, or by drying at a high temperature.

A weighed portion of the fat is saponified with alcoholic potash, and the solution accurately neutralized with acetic acid. It is then poured into an excess of a boiling solution of lead acetate. The precipitate is washed, then transferred to a stoppered bottle and treated with ether. The ether solution is filtered from lead stearate, etc., into a Muter's "olein tube," in which it is decomposed by dilute hydrochloric acid. The volume of the ethereal solution of the fatty acids having been read, an aliquot part is run into a flask and most of the ether distilled off. The ether vapour protects the fatty acids from the air. Alcohol is then added, and the solution is titrated with soda; this gives the total amount of the liquid fatty acids, calculating them as oleic acid. Another portion of the ethereal solution containing 0·5 gram of the fatty acid is then evaporated in a bottle, through which a stream of carbonic anhydride is being passed. When the last traces of ether are removed, 50 c.c. of Hübl's reagent is instantly added, and the bottle, having been stoppered, is placed in the dark for twelve

hours, side by side with a blank, after which the excess of iodine is titrated by thiosulphate. The authors anticipate that the "iodine absorbing power" thus ascertained will permit the amount of any admixture of fats to be calculated with more precision than has hitherto been possible.

Oil of Sesame and its Detection as an Adulterant in Olive Oil. W. Bishop. (*Journ. de Pharm.* [5], xx. 244-247; *Journ. Chem. Soc.*, January, 1890.) If this oil is shaken for a short time with pure hydrochloric acid of 21.22° B. in the proportion of 8 of oil to 12 of acid, no special effect is produced; but if the oil is exposed to air and solar light for some days, and the same test is applied, the mixture becomes green, and after a time the colour is found to be confined to the acid layer. If the action of air and light be much prolonged, the green colour is intensified, and after a still longer period a bluish violet, flocculent precipitate is produced. The green acid solution gives an absorption-spectrum almost exactly coinciding with that of chlorophyll. The application of this reaction will serve to indicate, when the results are positive, that a sample of sesame oil has been exposed to light and air for some time, and is not probably of recent production. Such an oil added to olive oil, in the proportion of 5 to 10 per cent., can be easily detected by this method; whilst 10 to 20 per cent. of oil of sesame may be detected in the same way after some days' exposure.

Detection of Cotton-seed Oil in Olive Oil. M. Labiche. (*Répertoire de Pharm.*, August 10, 1889.) The process recommended in this paper is as follows:—10 c.c. of the oil to be tested are mixed with 10 c.c. of ether, and then with 5 c.c. of a saturated solution of neutral lead acetate; the mixture is well shaken and poured into 5 c.c. of solution of ammonia. The production of an orange-red coloration proved the presence of cotton-seed oil, of which as little as 5 per cent. can be thus detected.

Detection of Linoleic Acid as an Adulterant in Oleic Acid. MM. Granval and Valser. (*Journ. Pharm.* [5], xix. 232-236.) Oleic acid is much used in the woollen manufacture, and the presence of linoleic acid causes serious inconvenience. In testing for this adulterant, comparative experiments should be made on commercial oleic acid of good quality. (1) The impure acid has a yellowish brown tint, paler than the standard. (2) The density is higher, say 0.912-0.919 in various samples at 15°, whilst the standard never exceeds 0.905. As the impure sample is clotty at 15°, it is necessary to take the specific gravity at a

higher temperature and add 0.00064 for each degree above 15°. (3) On heating the impure acid to 50°, it becomes more consistent after cooling, and this change is accentuated each time the operation is repeated up to a certain point. (4) 50 grams dissolved in 450 c.c. of 85 per cent. alcohol produces on shaking a glistening precipitate, whilst pure oleic acid dissolves completely; other oils give deposits, but not of the same character. The precipitate is collected, washed with alcohol, dried, and is then found to melt at about 47°. It is easily saponified, yielding a soda soap completely soluble in water, with which it forms a jelly on cooling, when only present to the amount of 1:100. (5) I Poutet's reagent be applied to the impure acid, the mass remains more or less liquid, whilst oleic acid becomes solid by the following day. (6) A thin film of the impure acid soon becomes resin-like, whilst the oleic remains almost unchanged. (7) If a few drops of impure acid are added to soda-lye, an intense yellow colour is produced, whilst the pure acid gives a greyish tint only.

Detection of Linoleic Acid in Commercial Olein. K. Hazura. (*Zeitschr. für angewand. Chem.*, 1889, 283, 284.) 50 grams of the oil are saponified with alcoholic potash, freed from the alcohol, and diluted to 1 litre. To the solution, which must be strongly alkaline, there is then added a litre of 5 per cent. of solution of potassium permanganate. After an hour it is filtered; the filtrate is acidified with sulphuric acid, filtered, neutralized with potash, evaporated to 300 c.c., and again acidified, whereupon a second precipitate is obtained. The whole is then shaken with ether, if the precipitate dissolves, it consists of azelaic acid, and the oil is free from linoleic acid. If it does not dissolve, it is collected, crystallized once or twice from water or alcohol, and its melting point determined. If this is above 160°, linoleic acid is certainly present. Less than 1 per cent. cannot, however, be detected.

Estimation of Mineral Oils in Fatty Oils. A. Grittner. (*Analyst*, June, 1890.) One of the most convenient processes is the one devised by Horn, which consists in saponifying the sample with alcoholic soda, and extracting the dry mass with chloroform. The author finds, however, that when the mineral oil preponderates, the extraction becomes tedious, and he therefore proceeds as follows:—About 3 grams of the sample are saponified in a porcelain dish with 20 c.c. of a solution of 25 grams of caustic soda in a litre of spirits of wine. After the alcohol has evapo-

rated the mass is mixed with sand, and then put into a cartridge, which is covered with a little filter. The extraction by means of chloroform is performed in the Soxhlet apparatus as usual. The chloroform is finally distilled off, and the residual oil dried at 100° C.

If the chloroform is not pure, it is best to redistil it over sulphuric acid. The sand used must be well washed with hydrochloric acid to free it from lime; otherwise there is danger of forming a lime soap, which is far from insoluble in chloroform.

Assay of Commercial Glycerol. M. Vizern. (*Journ. Chem. Soc.*, July, 1890.) Crude glycerol is usually sold by soap-makers as containing 80 per cent. of glycerol. This is affirmed on the part of buyers to be indicated by a minimum sp. gr. of 1.300 at 15°, and a boiling point of 155°. The author shows that an imitation crude glycerol of 80 per cent. strength had a sp. gr. of 1.289 and boiling point of 136° at 756 mm. Commercial samples were titrated for glycerol with dichromate (Hehner's method) after treatment with silver oxide and basic lead acetate. The results show that it is impossible to determine exactly the amount of glycerol in a sample by the specific gravity and boiling point, also that 80 per cent. glycerol has generally a density below 1.3, and a boiling point below 150°.

A Delicate Reagent for some Essential Oils. A. Ihl. (*Chem. Zeitung*, 1890, 438; *Amer. Journ. Pharm.*, June, 1890.) Pyrrol is recommended by the author as a delicate reagent for a class of essential oils which contain derivatives of allyl-benzol, as cinnamic aldehyde, eugenol, safrol, and anethol. The most delicate reaction was obtained with *oil of cinnamon*. A very dilute alcoholic solution of this oil, to which a small quantity of an alcoholic pyrrol solution, and then a little concentrated hydrochloric acid, is added, produces first a yellowish red colour, changing rapidly to dark red, and finally produces a dark precipitate. Traces of cinnamon oil and of pyrrol can be identified by this test. *Oils of cloves and pimenta* in alcoholic solution, as above, give rise to beautiful carmine colorations. *Oil of sassafras* produces a beautiful rose-red coloration. The *oils of fennel, anise and star-anise* give only faint reactions.

Iodine Absorption as a Test for the Purity of Essential Oils. H. W. Snow. (*Pharm. Journ.*, 3rd series, xx. 4.) The author has extended to a number of essential oils Hübl's process for the

detection of adulteration in fixed oils. For this purpose the process is worked as follows:—

Introduce into a tared flask having a capacity of about 60 c.c., 0.100 to 0.250 gram of the oil to be tested, and obtain the exact weight taken. Dissolve in 10 c.c. of chloroform, and add from 10 to 40 c.c. solution of iodine and mercuric chloride prepared as directed below, noting the exact amount introduced. The amount of iodine solution added must be such that after standing an hour or so the solution will have a distinct iodine colour, as the iodine must always be in quite decided excess. If the first portions are decolorized more may be added. After the solution has stood from forty to forty-eight hours, add 5 to 10 c.c. of strong solution of potassium iodide, and about 125 to 150 c.c. of water, titrate at once with decinormal solution of sodium thiosulphate, adding towards the last freshly prepared starch solution as an indicator.

	Time of Digestion.					
	3 hours.	6 hours.	15 hours.	24 hours.	40 hours.	48 hours.
Oil Peppermint . .	21.1	22.8	24.5	—	—	—
" " . .	—	—	—	—	179	179
" " . .	—	—	—	—	110	110
" " . .	—	—	—	—	120	126
" Bergamot . . .	—	—	300	—	—	345
" Orange Peel, bitter	—	—	321	—	—	362
" Turpentine . . .	291	333	245	353	—	397

Calculate results on the basis of the amount of iodine absorbed by 100 parts of oil. The solution of iodine is made by dissolving 25 grams of iodine in 500 c.c. of alcohol, and 30 grams of mercuric chloride in an equal amount of the same solvent. Mix the two solutions, and after twelve hours filter. Inasmuch as the strength of this solution is subject to considerable alteration on standing, it should always be determined at the same time the titrations are made with the chloroform solution of the oil. It is essential that after diluting the solution with water it should be titrated at once, as the compounds formed are extremely unstable as a rule, and on standing, iodine soon begins to be liberated, so that the solution again acquires a purplish to blue tint. Some comparative experiments have shown that at least forty hours must be allowed to elapse before the absorption of iodine is complete.

The following figures show the results and relate to the number

of parts of iodine which 100 parts of the oil will absorb in the time specified :—

	Time of Digestion.		
	6 hours.	15 hours.	40 hours.
Oil Peppermint	23.	24½	—
„ „ (adulterated)	84.7 !	74.1	—
„ „ „	88.3 !	73.6	—
„ „	—	—	179
„ „	—	—	109
„ „	—	—	67
„ „	—	—	71
„ „	—	—	106
„ „	—	—	105
„ „ Japanese	—	—	64
Menthol	none.	—	—
Oil Bergamot	—	—	345
„ Limes	—	—	289
„ Lemon	—	—	343
„ Orange (bitter)	—	—	362
Methyl Salicylate (synthetic oil wintergreen)	—	33¾	—
Oil Sweet Birch (sold as oil wintergreen) .	—	31¼	—
Oil Wintergreen (true)	—	1	—
„ Anise	—	—	121
„ Coriander	—	—	385
„ Caraway	—	—	233
„ Thyme	—	210 !	183
Thymol	—	201 !	181
Oil Lavender	—	—	286
„ Cloves	—	—	467
„ Sassafras	—	—	166
„ Pennyroyal	—	—	152
„ Camphor	—	—	129
Camphor	—	2¾	—
Oil Turpentine (fresh distilled)	—	—	397
„ Erigeron	—	—	280
„ Copaiba	—	—	250

The author's experiments afford an indication that the iodine absorption of essential oils may yield figures of considerable value in the determination of the purity of oils. But as these figures are not constants, he considers it necessary that maximum, minimum, and average equivalents should be determined by making estimates with a number of samples of the same oil and of unquestionable purity.

Detection of Petroleum in Oil of Turpentine. R. G. Dunwoody. (*Amer. Journ. Pharm.*, June, 1890.) According to Allen ("Organic Analysis," ii. 439), the following test is of value in the detection of petroleum. Three volumes of turpentine oil, with one volume

of castor oil, will produce a homogeneous mixture, while with petroleum the liquid separates into two layers nearly equal in volume. On trying a mixture made of different proportions of petroleum (sp. gr. at 15° C., 0.786; boiling point between 150° C. and 160° C.; known as head light oil), it was found that as much as 65 per cent. of petroleum could be mixed without detecting it by the above test.

Absolute glacial acetic acid, 99.5 to 100 per cent. was tried and found to mix in all proportions with petroleum as well as with turpentine oil.

A mixture of 99 c.c. of absolute glacial acetic acid with 1 c.c. of water when mixed with turpentine oil in the proportion of equal volumes formed a clear mixture, but with petroleum in the same proportions it would not mix. Mixtures of petroleum and turpentine oil in different proportions were found to require different amounts of the above acid for making a clear solution, as follows:—

	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.
Petroleum . . .	1	2	3	4	5	7	8
Turpentine Oil .	9	8	7	6	5	3	2
Glacial Acid . .	40	60	80	110	150	230	270

Analysis of Creoline. J. W. Gunning. (*Nederl. Tydschr. v. Pharmacie*, etc., Nov. 1889; *Analyst*, March, 1890.) To get an approximate assay of this disinfectant, the author operates as follows:—The creoline is mixed with petroleum ether of 80° C. boiling point. First, the two fluids mix, but on adding more the tar oils dissolve, whilst the resin soap separates, which, after having been washed a few times with petroleum ether, will be found soluble in water. On adding acid, the resin separates and may be purified with alcohol, and finally weighed. To identify the resin, its acidity equivalent may be taken. The amount of alkali contained in the article may be ascertained by the usual methods. The acid liquid, from which the resin has separated, may contain a little phenol, which may be estimated by shaking out with ether. The tar oils are obtained by evaporating the petroleum ether. On cooling, any naphthaline will show. Shaking with water will extract any phenol; soda-ley will extract cresol. Bodies of a basic nature may be shaken out with dilute acids, and extracted from the acid solutions by agitating with alkali and ether.

The residual tar oil is dried over calcium chloride, and further identified by its boiling point.

Examination of Crude Phenol and Cresol. W. W. Staveley. (*Chem. Zeit.*, xiii. 1126, 1127; *Journ. Chem. Soc.*, April, 1890.) It is pointed out that the method of testing crude phenols and cresols, by shaking with a double volume of 9 per cent. soda, and measuring the volume of undissolved liquid either with or without the addition of light petroleum, is untrustworthy: because, firstly, the quantity of soda is insufficient for material containing more than 60 per cent. of phenol; secondly, cresol, although insoluble in petroleum in the presence of water, is soluble when the petroleum contains 10–20 per cent. of coal-tar oils, moreover the higher homologues of cresol are soluble in any case; thirdly, the water in the crude phenol is taken up by the alkali, and is reckoned as phenol; and fourthly, material containing even 2 to 3 per cent. of naphthalene gives a perfectly clear solution. The method is more workable if four volumes of 10 per cent. soda are used, the alkaline layer separated, neutralized with dilute acid, agitated with a measured volume of benzene, and the volume read off. In Williams's method for examining carbolic powders, the quantity of alkali is also insufficient for treating rich material, whilst in Tidy's method not only is this the case, but also the solubility of the coal-tar acids in sodium sulphate is overlooked, and there is loss by volatilization of the phenol. In Tóth's method the strong alkali, of sp. gr. 1·250–1·300, gives rise to a strong solution of the cresoxides, which dissolve large quantities of hydrocarbons; moreover, any light hydrocarbons present could hold the free phenols in suspension, and so prevent their solution in the alkali. For estimating water in crude phenols, agitation of 50 c.c. with 30 to 50 c.c. of benzene and 30 c.c. of 50 per cent. sulphuric acid is recommended; the sulphuric acid is better than calcium chloride, which in its turn is better than sodium chloride.

A New Reaction of Tannin. C. Böttinger. (*Chem. Répert.*, 1890, 152.) A solution of gallotanic acid, when boiled for some time with phenylhydrazin, and then carefully mixed with solution of sodium hydrate, produces a deep greenish blue coloration, changing to yellow. The reaction is delicate and characteristic for tannin, it is not shared by either gallic or pyrogallie acid.

Volumetric Process for the Estimation of Tannin. E. Guenez. (*Comptes Rendus*, cx. 532; *Chemical News*, April 25, 1890.) The author founds a rapid process for the determination of tannin upon the following reactions:—

1. If a solution of tannin is added to a boiling solution of potassium-antimony tartrate mixed with a suitable aniline colour, a precipitate of antimony tartrate is formed, which carries down the colouring matter, forming a true lake. If the proportion of tannin is sufficient, the supernatant liquid becomes colourless. The antimony salt must be in excess in reference to the colouring matter.

2. The volume of the coloured solution of the antimony salt, and the volume of the solution of tannin which must be added, are always proportional. Dilution does not affect the results.

3. A given quantity of antimony tannate always fixes the same quantity of colouring matter.

4. If a solution of gallic acid is poured into a boiling solution of the antimony salt, no immediate precipitate of antimony gallate is formed. Under the same conditions, the antimony tannate is produced immediately. Hence it is permissible to suppose that the presence of gallic acid does not interfere.

The method of operating is as follows:—

A solution is prepared of—

Antimony Salt	12 grms.
Poirier's Green, 4 JE	1 gm.
Distilled Water.	1 litre.

The antimony salt and the colouring matter are dissolved separately; the two solutions are then mixed and filtered. The aniline greens are the only colours suitable, and Poirier's green, 4 JE has given excellent results. This solution is standardised by means of a solution of tannin in ether, perfectly pure and previously dried in a vacuum over sulphuric acid. A solution is made up containing 5 to 6 grms. per litre, with the addition of a small quantity of thymol, dissolved in alcohol, to prevent mouldiness.

A burette, fitted with a glass tap, is filled with a solution of tannin, while 20 c.c. of the coloured solution of antimony salt, and an equal volume of distilled water, are placed in a glass tube 35 c.m. in diameter. The coloured solution is raised to a boil, and the tannin liquid added until the complete decoloration of the liquid, which must be boiled anew after each addition of tannin. A green flocculent precipitate is formed, which readily collects together and enables the decoloration of the liquid to be observed. When complete, the volume of the tannin consumed is read off, and the standard of the antimony solution is thus known.

This method is readily applicable to the analysis of industrial extracts, but as the tannins of these extracts are not identical with the tannins of gall-nuts, which has been selected as a standard, the richness of an extract will be represented in the analysis by an equivalent weight of nut-gall tannin.

Estimation of Tannic Acid in Oak Bark, with Permanganate. F. Gantler. (*Zeitschr. für angew. Chemie*, No. 20, 1889.) The author found that tannin is completely and *quantitatively* oxidized by permanganate when its solution is mixed with dilute sulphuric acid and boiled. To estimate the tannin in a sample of oak bark, the following solutions are wanted: (1) The usual bark decoction, 10 grms. per litre. (2) A solution of permanganate, containing 3.988 grms. of $K_2 Mn_2 O_8$ per litre. (3) A solution containing 7.951 grms. of oxalic acid per litre. 10 c.c. of the bark solution are mixed with 10 c.c. of dilute sulphuric acid, and heated to nearly boiling. Permanganate is now added, about 1 c.c. at a time, until the red colour begins to disappear very slowly. The liquid is now once more heated to boiling, and permanganate is *gradually* added in excess, which causes a heavy brown precipitate. Oxalic acid is now run in until the liquid has become quite clear, and permanganate is then again added until the red colour is restored. The total number of c.c.'s of permanganate used, less those of oxalic acid, is the amount reduced by the tannin, and at once represents the percentage of tannin in the sample.

It is advisable to repeat the experiment after removal of the tannin by hide powder as usual. The author is now engaged in trying to find out the exact relation between permanganate and the various kinds of tannic acid.

On Gantler's Method of Estimating Tannin. H. R. Procter. (*Journ. Soc. Chem. Ind.*, March, 1890.) The author has critically examined this method (see preceding abstract), and arrives at the conclusion that, unless further perfected, it cannot supersede Löwenthal's process. The amount of the permanganate consumed is found to be materially influenced by the excess of permanganate added, and the amount of boiling to which it is submitted. He admits that by adherence to a rigid scheme of operation, concordant results might be obtained, but considers that such results could only have a comparative value.

Colorimetric Method of Estimating Tannin in Barks, etc. S. J. Hinsdale. (*Amer. Journ. Pharm.*, 1890.) Dissolve 0.04 gram potassium ferricyanide in 500 c.c. water, and add to it 1.5 c.c. (about 22 drops) of liquor ferri perchloridi.

Dissolve 0.04 gram of "pure" tannin (gallotannic acid), which has been dried at 212° F., in 500 c.c. of water.

Exhaust 0.8 gram of oak bark with boiling water, and make it up to 500 c.c. with cold water.

Place six two-ounce clear glass tumblers (or beaker glasses) on a white surface, and in one of them, with a dropping pipette (about four inches long and one-quarter inch wide) about half filled, put five drops of the infusion of bark, and in the others, with the same pipette (after rinsing), put 4, 5, 6, 7 and 8 drops of the "tannin solution." (The drops of the infusion and of the tannin solution must be uniform. The use of the same pipette, about half-filled, insures that.)

Now, add to each 5 c.c. of "iron mixture," and in about one minute add to each tumbler about 20 c.c. of water, and within three minutes observe the shades of colour. The number of drops of "tannin solution" used in the tumbler which corresponds in shade of colour to the tumbler containing the infusion of bark, indicates the percentage of tannin in the bark, *i.e.*, if it is the one in which seven drops were placed, the tannin strength of the bark is seven per cent.

For substances containing between 10 and 20 per cent. it is best to dilute the infusion with an equal volume of water and to proceed as above, using five drops of the dilute infusion. The result is then multiplied by two.

For substances containing less than one or one and a half per cent., exhaust 8 grams instead of 0.8 gram, and take one-tenth of the result for the answer. For substances containing more than twenty per cent., as galls, sumach, catechu, etc., dilute the infusion with two, three or more times its bulk of water, and calculate as above (as with tea), or use 1, 2, 3 or 4 drops of the undiluted infusion in the first glass, and calculate accordingly.

The "iron mixture," "tannin solution," and infusion must be freshly prepared and not exposed to sunlight.

Tannin Estimations. F. Reinitzer. (*Chem. Centr.*, 1889, ii. 292, 293.) The author arrives at the conclusion that the methods at present employed for the determination of tannin are not suitable for physiological investigations, however useful they may be for the practical valuation by the tanner.

Process for Increasing the Dyeing Power of Logwood Preparations. W. W. Macfarlane and P. S. Clarkson. (*Chemist and Druggist*, April 12, 1890.) In a paper presented to the Franklin Institute, the authors call attention to the action of

chlorine upon logwood and hæmatoxylin. Dyers know that a decoction of logwood made in contact with the air is much stronger than one made by boiling the wood under pressure in a closed vessel. It is also known that processes have existed for the past forty years for increasing the strength of logwood decoctions by means of oxidizing agents. For instance, there is an old patent in which the use of chlorates, nitrates, and the like for this purpose was protected. The authors, in some preliminary experiments, found that chlorine water had the same effect, and on critical trial they discovered that when chlorine was added in the proportion of four atoms to one molecule of hæmatoxylin, the dyeing strength was increased by 150 per cent., owing to the formation of hæmatein.

Formation of Tannin in Leaves. G. Kraus. (*Bied. Centr.*, xviii. 330-334.) The author finds that the formation of tannin in leaves depends on the presence of light and carbonic anhydride. The outer leaves of a plant exposed to direct sunlight proved to contain far more tannin than the inner leaves. Leaves which are not green are not capable of producing tannin. The tannin formed in the leaves passes into the branches and roots. Falling leaves prove to contain as much tannin as they did during their best time of growth. In the author's opinion there is not yet sufficient evidence to show whether tannin is produced from non-nitrogenous substances, or whether it is formed in the conversion of nitrogenous compounds into albuminoids.

Carotene and the Green Colouring Matter of Chlorophyll Grains. H. Immendorff. (*Chem. Centr.*, 1890, i. 163, 164.) The author arrives at the conclusion that carotene is undoubtedly the yellow colouring matter of chlorophyll grains, and that it is also the cause of the autumnal colour of the leaves.

Constituents of Vegetable Cell-Membrane. E. Schulze. (*Ber. der deutsch. chem. Ges.*, xxii. 1192-1196.) The author has examined the cell-membranes of a number of seeds, such as soya-bean, peas, vetches, field-beans, coffee-berries, date stones, young red clover, lucerne, and in the hard parts of the cocoa and palm nut. The results show that the cell-membrane of the seeds investigated contains several carbohydrates as well as cellulose, the former differing from the latter in being insoluble in ammoniacal copper solutions and in being far more readily converted by acids into saccharoses.

Pectic Compounds in Plants. L. Mangin. (*Comptes Rendus*, cix. 579-582.) Pectic compounds are essential constituents of plant structures. They are always present in the cell-membranes,

occasionally also in the cell contents, and in isolated cases even in the nucleus. Their presence can be readily recognised by methylene blue or Bismarck brown, which stain these compounds without affecting the cellulose.

Inulin in the Flowers of Compositæ. L. Daniel. (*Comptes Rend. Soc. Biol.* [9], i. 182-184.) Inulin, which has already been found in the roots of many plants of the *Compositæ*, is now shown by the author to occur also in considerable quantities in the flowers of many members of this order. Its formation there appears to be favoured by darkness, since it is absent in parts exposed to light. Its presence is found to be only temporary, as it disappears during the development of the ovary and embryo.

Boric Acid as a Plant Constituent. C. A. Crampton. (*Ber. der deutsch. chem. Ges.*, xxii. 1072-1076.) The author confirms the presence of boric acid in wines, and has also detected it in the ash of water-melons and peach trees. He concludes that it must be regarded as a much more general constituent of plants than has hitherto been supposed.

The Occurrence of Salicylic Acid in certain Genera of the Liliaceæ. A. B. Griffiths. (Abstract of a paper read before the Chemical Society. From the Society's Proceedings.) The author has isolated salicylic acid from various parts of *Tulipa*, *Yucca*, and *Hyacinthus*, and estimated the percentage occurring in them. The following are the results obtained:—

	Tulipa.	Yucca.	Hyacinthus.
Leaves	0.0989	0.1414	0.1103
Peduncles	0.0812	—	0.0788
Stems	—	0.1065	—
Bulbs	0.0542	—	0.0483
Flowers	trace	—	trace

The Use and Change of Alkaloids in some Seeds during Germination. E. Heckel. (*Comptes Rendus*, 1890, cx. 88; *Amer. Journ. Pharm.*, June, 1890.) The author has examined the behaviour of strychnine, brucine, daturine, and caffeine during germination. For *caffeine* the seeds of *Sterculia acuminata* were used. The fresh seeds contained in 100 gm. 2.37 gm. of caffeine; after one year the cotyledons contained only 1.072 gm., after two years, 0.70 gm., and after three years 0.21 gm. During the time the alkaloid disappeared, chlorophyll and potassium nitrate, which are never present in the recent seeds, made their appearance.

For the alkaloids of the pyridine series *Strychnos Nux vomica* and *Datura Stramonium* were used. In a relatively short time (2-5 months, depending on the size of the seeds) all the alkaloids in the endosperm had been converted into more assimilable compounds. That this change is produced by the embryo was shown by removing the latter and placing the seeds in moist earth, when the endosperm retained its entire amount of alkaloids. In *Physostigma venenosum* the eserine disappears in the cotyledons during germination, and the new compounds are transported into the young plant. Eserine disappears also when the embryo is removed, and the seed is then planted. From his experiments, the author draws the conclusion that the alkaloids act as reserve material for the nourishment of the young plant, and must undergo a change in chemical constitution to become assimilable.

Influence of Yeast on the Bouquet of Wines. A. Rommier. (*Bull. de la Soc. Chim.* [3], ii. 297-300.) The author fermented the juice of an inferior grape and of hothouse grapes respectively with yeast-cultures obtained from the Champagne, Côte d'Or, and other districts, and found that in each case the resulting wines had the bouquet of the wines from whence the yeasts were derived.

Absorption of Atmospheric Nitrogen by Soils. T. Schloesing. (*Comptes Rendus*, cix. 210-213.) The author's experiments furnish additional support to the conclusion that no soil which is not actually supporting vegetation can absorb nitrogen directly from the atmosphere.

Absorption of Atmospheric Nitrogen by Soils. M. Berthelot. (*Comptes Rendus*, cix. 417-419.) The author considers the direct absorption of nitrogen from the air by soils under the combined influence of microbes and of vegetation as a definitely established fact. With sterilised soils, or with soils already saturated with nitrogen, no such absorption occurs. Vegetation is therefore an absolutely indispensable condition.

Ammonia Salts and the Nutrition of Plants. A. Müntz. (*Journ. de Pharm. et de Chim.* [5], xx. 489-492; *Comptes Rendus*, cix. 646-648.) The author's researches afford proof that the higher plants have the power of directly utilising the nitrogen of ammonium salts, and that preliminary nitrification is not essential.

Comparative Manurial Values of Chili Saltpetre and Ammonium Sulphate. C. Rolland. (*Bied. Centr.*, 1889, 508-511.) The results of experiments recorded in this paper prove the decided superiority of sodium nitrate over ammonium sulphate.

Besides being the cheaper manure, the nitrate brought a heavier yield of wheat.

Action of Sodium Chloride on Soils and Plants. A. Stood. (*Landw. Versuchs-Stat.*, 1889, 113-118.) Water containing $\frac{1}{10}$ per cent. of sodium chloride or more is found to damage vegetation; and half that proportion appears to be sufficient to destroy the germination of seeds. Valuable constituents of the soil, such as calcium phosphate, are rendered soluble by the salt and washed away out of reach of the plant. Analyses of plants thus affected show that the increase of sodium chloride is accompanied by a decrease of potash and sulphuric acid.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

The Chemical Constituents of *Scopola Carniolica*. W. R. Dunstan and A. E. Chaston. (*Pharm. Journ.*, 3rd series, xx. 461.) Some time ago F. Ransom brought under the notice of one of the authors a rhizome which had appeared in the drug market, being offered as a substitute for the root of *Atropa Belladonna* under the name of *Belladonna Scopolia*. It was imported from Germany, and was stated to grow wild in the Carpathian mountains and in other parts of Austro-Hungary. The juice of the plant was supposed to possess mydriatic properties.

The author's chemical investigation of the rhizome shows that of the known mydriatic alkaloids, *Scopola carniolica* contains only hyoscyamine, with possibly a minute amount of hyoscyne. This plant thus appears to be distinguished from others yielding mydriatic alkaloids, in containing hyoscyamine in an almost, if not quite, pure condition, and therefore promises to prove a new and important source of this alkaloid. The authors deem it necessary, however, to state that in investigating the alkaloidal constituents of this plant advantage has been taken of the facts recently established with reference to the instability of hyoscyamine when in contact with fixed alkalies, or when heated to the temperature of boiling water. The plant was dried at a low temperature, exhausted with cold alcohol, and the alcoholic percolate was evaporated at 30–40°, whilst no fixed alkalies were used in extracting the alkaloid.

From the fatty and resinous constituents of the rhizome, by treating the acidulated mixture with chloroform, a mass of needle-shaped crystals was obtained melting at 137·5°, and on combustion yielding results agreeing with the formulæ $C_{36}H_{44}O$ or $C_{27}H_{46}O$, each of which has been assigned to cholesterin. The amount was rather more than 0·1 per cent. It appears to most nearly resemble phytosterin (from seeds) and daucosterin (from carrots), and to have been for the first time noticed in the natural order *Solanaceæ*

The authors obtained it also from the root of *Atropa Belladonna*, and approximately in the same amount as before from the scopola rhizome. After recrystallization of the acids, obtained by saponifying the fat, they appear to consist mainly of arachic acid, $C_{20}H_{40}O_2$.

A crystalline sugar has also been obtained which reduces Fehling's solution, and yields an osazone apparently identical with that obtained from dextrose. A crystalline substance which is highly fluorescent, especially in alkaline solutions, appears to be identical with Eykman's scopoletin and with the chrys-atropic acid of Kunz; there are grounds for believing it to be methyl-æsculetin.

The Pharmacy of Scopola Carniolica. F. Ransom. (*Pharm. Journ.*, 3rd series, xx. 464.) The percentage of alkaloid was determined by a slight modification of the process proposed by Dunstan and the author for the assay of belladonna (see *Year-Book of Pharmacy*, 1884). Two samples of the root yielded 43 and 51 per cent. of alkaloid, while from belladonna root 35, 38, and 39 per cent. had been obtained. Experiments made with menstrua of different alcoholic strength showed that a mixture of 4 parts of alcohol and 1 part of water extracted more alkaloid than a weaker or stronger spirit. Based upon these results, the following preparations are proposed:—

Extractum Scopolæ Alcoholicum. (Alcoholic Extract of Scopola.)

Take of—

Scopola Rhizome in No. 20 powder	. . . . .	1 pound.
Rectified Spirit	. . . . .	48 fluid ounces.
Distilled Water,		
Sugar of Milk	. . . . .	of each a sufficiency.

Mix the spirit with 12 fluid ounces of distilled water. Macerate the scopola in two pints of this mixture for forty-eight hours, agitating occasionally; then transfer to a percolator, and when the fluid ceases to pass, continue the percolation with the remainder of the diluted spirit. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and evaporate over a water-bath to the consistence of a soft extract. Estimate the alkaloidal strength of this extract by the following method:—

Dissolve 2 grams of the extract in about 10 c.c. of warm distilled water acidulated with a few drops of diluted hydrochloric

acid; pour the solution into a stoppered glass separator, and add ammonia until the liquid is distinctly alkaline. Agitate for a few minutes with 10 c.c. of chloroform, separate, and again wash the aqueous liquid with 3 c.c. of chloroform. Agitate the mixed chloroform solutions with 10 c.c. of diluted hydrochloric acid, separate, wash with 3 c.c. of the diluted acid, mix the acid solutions, render alkaline with ammonia, and agitate with 10 c.c. of chloroform. After separation wash the alkaline solution with 3 c.c. of chloroform, mix the chloroform solutions, evaporate in a dish of known weight, and dry the residue, which should be nearly colourless, at a temperature of 200° F. (93° C.). The weight of the residue thus obtained multiplied by fifty will give the percentage of alkaloid present in the extract.

Having thus ascertained the strength, warm the extract over a water-bath in a dish of known weight, and adjust by evaporation or by the addition of distilled water and sugar of milk in such proportion that the finished extract shall be of firm consistence and shall contain two per cent. of alkaloid.

Extractum Scopolæ Liquidum. (Liquid Extract of Scopolia.)

Take of—

Scopola Rhizome in No. 20 powder . . . 1 pound.

Rectified Spirit,

Distilled Water. . . . of each a sufficiency.

Mix 24 fluid ounces of the spirit with 6 fluid ounces of distilled water. Macerate the scopolia in this mixture for forty-eight hours, agitating occasionally. Transfer to a percolator, and when the fluid ceases to pass subject the marc to pressure, and filter the product. Mix the liquids and measure the exact volume of the mixture (*a*), after removing 25 c.c. for analysis. Evaporate the 25 c.c. over a water-bath to the consistence of a soft extract. Estimate the alkaloid present in this extract by the process given in the formula for the alcoholic extract. The weight of the residue thus obtained, multiplied by four, will give the parts by weight of the alkaloid in 100 fluid parts of the liquid (*a*).

Adjust the total volume of this liquid, either by evaporation over a water-bath, or by the addition of a mixture of four fluid parts of rectified spirit and one fluid part of distilled water, so that 100 c.c. of the liquid extract shall contain .25 gram of alkaloid.

Emplastrum Scopolæ. (Plaster of Scopola.)

Take of—

Alcoholic Extract of Scopola . . .	4 ounces.
Resin Plaster,	
Soap Plaster	of each 8 ounces.

Melt the plasters by the heat of a water-bath, then add the extract, and mix the whole thoroughly together.

This plaster contains nearly '4 per cent of alkaloid.

Linimentum Scopolæ. (Liniment of Scopola.)

Liquid Extract of Scopola . . .	24 fluid ounces.
Camphor	1 ounce.
Rectified Spirit,	
Distilled Water	of each a sufficiency.

Dissolve the camphor in the liquid extract, and dilute to 30 fluid ounces with a mixture of 4 fluid parts of rectified spirit and 1 fluid part of distilled water.

One hundred fluid grains of this liniment contain one-fifth grain of alkaloid.

Tinctura Scopolæ. (Tincture of Scopola.)

Take of—

Liquid Extract of Scopola . . .	4 fluid ounces.
Proof Spirit	21 " "

Mix.

One hundred fluid grains of this tincture contain $\frac{1}{25}$ th grain of alkaloid.

Unguentum Scopolæ. (Ointment of Scopola.)

Take of—

Alcoholic Extract of Scopola. . .	1 ounce.
Benzoated Lard	9 ounces.

Mix thoroughly.

This ointment contains '2 per cent. of alkaloid.

Observations on the Therapeutic Action of Scopola Carniolica.

Sir Dyce Duckworth. (*Pharm. Journ.*, 3rd series, xx. 466.) The author records a number of clinical observations leading to the conclusion that scopola is a drug which proves itself equally effectual with belladonna. He thinks that if it can be supplied at a cheaper rate than the latter drug, it can hardly fail to prove

a boon to a large class of sufferers who can ill-afford to pay for efficient local employment of belladonna.

The author is still continuing his investigations.

The Natural History of *Scopola Carniolica*. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xx. 468.) This paper gives a complete history of the plant, commencing with Matthioli, who, in 1563, named it *Solanum somniferum alterum*. It was further described in 1622 by Caspar Bauhin, under the name of *Solanum somniferum bacciferum*; in 1651, by J. Bauhin, as *Solanum manicum* "quod secundo loco proponimus"; in 1671, by J. A. Scopoli, Professor of Botany at Pavia, as *Atropa caule herbaceo foliis ovatis, integris, fructu capsulari*; in 1764, by Jacquin as *Scopola carniolica*; in 1767 by Linnæus as *Hyoscyamus Scopolia*; in 1794 by Moench as *Scopola trichotoma*; in the same year by Schultes as *Scopolina atropoides*; in 1821 by Link as *Scopolia atropoides*, and in 1837 by G. Don as *Scopolia carniolica*.

The generic name, *Scopolia*, had been applied in 1763 by Adanson for what is now *Ricotia*, *Lin.*, *Cruciferae*; in 1776 by Forster, for what is now *Griselinia*, *Forst.*, *Cornaceae*; in 1781 by Linnæus fil., for what is now *Daphne*, *Lin.*, *Thymelaceae*; in 1790 by Smith for what is now *Toddalia*, *Juss.*, *Rutaceae*.

Jacquin's name for the plant being the first binomial one published after the date of the first edition of Linnæus' *Species Plantarum* in 1753, should supersede the later names given by others. The author repeatedly writes "*Scopola*" (not *Scopolia*) in his published work.

The geographical distribution of *Scopola carniolica* appears to be limited to south-west Germany (Bavaria), Austro-Hungary (Styria, Carinthia, Carniola, Croatia, Banat, Transylvania), and south-west Russia (Podolia and Volhynia). It grows in damp, stony places among bushes in beechwoods on calcareous soil, chiefly in hilly or mountainous districts. In appearance it closely resembles belladonna in shape of leaf, shape, colour, and position of flower, in the branching of the stem, and in the floral leaves being frequently geminate. But it differs in its short stature (about one foot high), in the more reticulated, thinner leaves, the capsular, transversely dehiscent fruit, and in the presence of a rhizome.

Two varieties of the plant were described by Koch, the common form having tubular bell-shaped flowers of a brownish purple colour, and the other growing at a higher elevation, having an obovate-campanulate corolla of a green colour. The latter was

described by Koch under the name of *Scopolina Hladnikiana*, suggested to him by Freyer, who also issued the plant as *Scopolina viridiflora*, in Rabenhorst's *Flor. Eur. Exsicc.*, No. 2056. A third variety, with yellow conical-campanulate flowers, is mentioned by Decandolle under the varietal name, *β -concolor*.

The genus forms a link between the genera *Hyoscyamus* and *Atropa*. In the tissue of the rhizome it more nearly approaches the latter genus in having the peculiar sandy raphides present in both root and leaves of belladonna, but not in henbane.

Bentham and Hooker refer two other plants to the genus "*Scopolia*," viz.: *Scopola japonica* and *S. lurida*. The former was described by Maximowicz; but in a recent letter he states that he has strong doubts about its being a good species, and that it is hardly different from the European plant.

S. lurida, Dun., is a Himalayan species, which has also been referred to under the names, respectively, of *Anisodus luridus*, Link and Otto; *Nicandra anomala*, Link and Otto; *Physalis stramonifolia*, Wallich; *Whitleya stramonifolia*, Sweet; *Anisodus stramonifolius*, G. Don. The large fusiform root seems worthy of chemical investigation, since, according to E. J. Waring, it is as powerful as belladonna, if not more so. The author (E. M. Holmes), finds in the fresh root the peculiar raphides common to the other two species, but more abundant in the cortical portion. The leaves, flowers, and calyx of the plant recall the characters of *Physalis* rather than of *Scopola*.

A wood-cut illustration of *Scopola carniolica* accompanies the original paper (*Pharm Journ.*, p. 469).

Histological Characters of the Rhizome of *Scopola Carniolica* compared with those of the Root of the *Atropa Belladonna*. T. Greenish. (*Pharm. Journ.*, 3rd series, xx. 471.) The author has made histological examinations of the root of belladonna and the rhizome of *Scopola carniolica*, with the view to determine if any, and what, structural differences may exist between them.

Immediately under the epidermis of belladonna root there is a layer of cortical cells forming a dark line. On isolating the individual cells, it is found that this cortical layer consists of from six to eight tabular cells deeply coloured. Next, but inward in the root, are several layers of thin cells, pressed or stretched in a tangential direction, long and narrow; and further down again several layers of cells not so long and wide, being subjected to less pressure they tend more towards the shape of the cell in its normal condition. These together constitute the bark.

Within the bark there is a faint thin line, the cambium layer externally surrounding the vascular bundles, which are themselves imbedded in the cellular or fundamental tissue, and in somewhat definite lines. The cells of the bark within that dark line are of a faintly brown colour, and the same remark applies to the cells composing the fundamental tissue, but there is an entire absence of schlerenchymatous cells.

All the parenchymatous cells of the bark, and from the bark inwards, are more or less filled with starch grains, but these were removed to make the structure more visible. Most of them *in situ* are compound grains, being composed of two or more adhering together. The typical form is the muller-shaped grain. When the combination is a doublet, they adhere by their truncated bases; and when a triplet, they are muller-shaped with dihedral bases. A dark spot will be seen here and there in the fundamental tissue; these are cells of raphides cut in a transverse direction. Examining these raphides by a micro-chemical process, the application of acetic acid slowly permeating the tissue under the slide, there was no effervescence, and it was concluded that the raphides are not composed of a carbonate; most probably they are oxalates. Longitudinal sections of each were made, but they exhibited nothing special beyond the cells above referred to, in their length showing a long cell or sac filled with raphides.

In the rhizome of *Scopola carniolica*, the dark line under the epidermis is narrower and less coloured than that of the belladonna. The entire bark is not so thick; also, the vascular bundles are neither so large nor so numerous, and the bundles of raphides are less bold than in the belladonna root. Much the same tissues are present, but less pronounced than in belladonna. The starch grains also are smaller, the typical grains being, as in belladonna, muller-shaped, but there is a large number which it is difficult to assign to any well-defined type of starch grains.

On the whole, there seems a close alliance in anatomical structure between the rhizome of *Scopola carniolica* and the root of *Atropa belladonna*.

The description of the sections is illustrated by woodcuts. (*Pharm. Journ.*, 471.)

Scopolia Japonica. E. Collin. (*Pharm. Journ.*, 3rd series, xx. 792.) The author has made an extended microscopical examination of the rhizome of *Scopolia japonica*, and finds that it differs from *S. carniolica* only in the greater size of the fibro-vascular bundles, these being rather less developed in the case of

S. carniolica. In the radial arrangement of the vascular bundles, in the presence of starch, in the pulverulent form of the raphides of oxalate of calcium, and in the absence of lignified fibres from the pericycle, these rhizomes are analogous to belladonna.

Japanese Aconite. E. G. Reig. (*Amer. Journ. Pharm.*, March, 1890.) The author prepared from this drug a tincture and a fluid extract, following the formulæ of the U. S. Pharmacopœia for the corresponding aconite preparations. Both were lighter in colour than the officinal ones. On evaporating 10 gm. of each, the tincture yielded 200 mgm., and the fluid extract 620 mgm., of extract. The alkaloids were determined by evaporation, taking up with water, removing colouring matter by ether, rendering alkaline by sodium carbonate, and extracting the alkaloids by ether. 50 gm. of the tincture, representing 20 gm. of root, yielded 67 mgm. of alkaloids. 40 c.c. of the fluid extract (= 40 gm. of the root) gave 145 mgm. of alkaloids. The Japanese aconite used, therefore, contained 0.35 per cent. of alkaloids.

Fraudulent Jalap. F. A. Flückiger. (*Journ. de Pharm. et de Chim.*, xxi. No. 1.) The roots of jalap, which in 1842 yielded 17 per cent. of resin, now rarely yield more than 12, sometimes only 7.50. The Mexican dealers extract the resin from the roots by treatment with alcohol.

Podophyllum. C. G. Dunn. (*Amer. Journ. Pharm.*, March, 1890.) The author states that the most active constituents of the resin are contained in the first portion of the alcoholic percolate, while the later percolates yield a resin which differs very much from the former in activity. Podophyllotoxin may be prepared by macerating one ounce of the resin in four fluid ounces of chloroform free from alcohol, filtering, and adding the filtrate to sixteen parts of benzin. It forms a light, yellowish-white powder, the chloroformic solution of which should remain clear on the addition of ether, but deposit white flocks when mixed with petroleum spirit.

Podophyllum Emodi. F. A. Thompson. (*Amer. Journ. Pharm.*, May, 1890.) *Podophyllum Emodi* inhabits shady valleys on the inner range of the Himalaya, and is very abundant in Kunawur and Cashmere. The root agrees in most particulars with that of *Podophyllum peltatum*, but differs in the intervals of the knots whence aërial stems are given off, the knots being more frequent in this species. Dymock and Hooper state that the sample examined by them yielded 12 per cent. of amorphous resins, of a pale orange-brown, soluble in alcohol, ether, chloroform, and almost entirely so in ammonia, and upon ignition left

no residue, and that when given in doses of half a grain it produced slight griping sensation not uncommon to podophyllin when administered by itself.

The large yield of resin, similar to podophyllin in physiological action, induced the author to make an analysis of it. The following results were obtained:—

	Per cent.
Ash	none.
Moisture	4.2
Oily and waxy matter, soluble in benzin	4.0
Podophyllotoxic Acid	13.1
Podophyllotoxin, active principle	56.55
Inert matter, insoluble in chloroform and soluble in alcohol	22.15
	<hr/> 100.0

The percentage of active principle, podophyllotoxin, in this sample is fully 25 per cent. higher than the average amount found in resin of podophyllum, which varies from 40 to 45 per cent. American podophyllum yields on a large manufacturing scale, 5 per cent. of podophyllin, and accepting 10 per cent. as a practical average from the Indian, the latter drug would be worth two and a half times the value.

Japanese Senega. L. Reuter. (*Pharm. Centralhalle*, 1889, 609.) A sample of this Japanese drug, which appears to be the produce of *Polygala tenuifolia*, has been examined by the author, who finds that it yields to ether 9.6 per cent. of a yellow mass, consisting of 0.8 per cent. of resin, and 8.8 per cent. of oil, which has an odour resembling that of patchouli.

Detection of Senega. L. Reuter. (*Chem. and Drugg.*, August 31, 1889, from *Archiv der Pharmacie*.) The author offers the following test for the chemical identification of senega root, which is based upon its quite constant constituency of methyl salicylate:—5 grammes of dried and powdered senega are macerated for fifteen minutes with 50 c.c. of water, temperature about 60° C, filtered, the filtrate acidified with 3 drops of official hydrochloric acid, and agitated with 50 c.c. of ether; the ethereal layer is decanted, and the ether allowed to dissipate spontaneously. There should be sufficient residue, so that when treated with 20 c.c. of water at 60° C., and the solution with 1 drop of ferric chloride solution, a distinct violet colour should be developed.

Constituents of the Root of Berberis Aquifolium. E. Schmidt. (*Chem. Centr.*, 1889, 580.) The root of *Berberis aquifolium* contains

berberine, oxyacanthine, berbamine, and phytosterin. The composition of berbamine corresponds to the formula $C_{18}H_{19}NO_3$.

Action of Hydrastis Canadensis. M. Heinrichs. (*Amer. Journ. Pharm.*, January, 1890.) From his physiological experiments on rabbits, the author concludes that small doses strengthen the respiration for a short time; large doses stop it for a time, and then render the movement superficial. He could not find it to exercise any influence on the contractile power of the uterus or vagina.

Scutellaria Lanceolaria. D. Takahashi. (*Chem. Centr.*, 1889, ii. 100.) The root of *Scutellaria lanceolaria*, one of the Labiatae, is used medicinally in China and Japan. By extracting the root with ether, agitating the ether extract with sodium hydroxide, and acidifying the alkaline solution, a yellow flocculent substance, *scutellarin*, is obtained. It forms odourless and tasteless, shining, flat, yellow needles, melts at $199-199.5^\circ$, is insoluble in cold, little soluble in hot water, very readily soluble in alcohol, ether, chloroform, light petroleum, and carbon bisulphide; soluble in sodium hydroxide and carbonate solutions, but carbonic anhydride is not expelled from the latter. It dissolves in concentrated sulphuric acid with a yellow coloration, and water reprecipitates the substance unchanged. It dissolves in nitric acid with red coloration, and in like manner in a solution of sulphuric acid and potassium nitrite. Fehling's solution is not reduced by it, even after boiling with hydrochloric acid. It does not combine with phenylhydrazine; neither silver nitrate nor lead acetate precipitates it from its alcoholic solution, but solutions of lead and copper acetates produce a yellow-red precipitate with the alcoholic solution. When treated with bromine in carbon bisulphide solution, a substance crystallizing in yellowish needles is formed; the determination of bromine in it, however, gave unsatisfactory results. The elementary analysis of scutellarin gave figures which corresponded with the formula, $C_{10}H_8O_3$; it contains neither nitrogen nor water of combination. 5 grams of scutellarin produced no effect when administered to a dog in an emulsion of milk and gum arabic. The author believes it to be a phenol, and possibly an isomeride of juglone.

The Active Principle of the Root of Stylophoron Diphyllum. F. Selle. (*Archiv der Pharmacie* [3], xxviii. 96-109.) The author has exhaustively examined *stylophorine*, an alkaloid obtained from the above root, and finds that it is identical with *chelidonine*, $C_{20}H_{19}NO_5 + H_2O$. Hydrochloric acid under pres-

sure at 150° does not act on this alkaloid. When heated with aqueous iodine in a glycerol bath, no methyl iodide was formed, and silver nitrate solution was scarcely rendered turbid. The base therefore contains no methoxyl-group. Chelidonine, although the principal alkaloid of the root examined, is not the only one; at least two others have been detected, which will be further investigated when more material is available.

A Comparative Examination of *Krameria Triandra* and *Krameria Argentea*. R. G. Dunwoody. (*Amer. Journ. Pharm.*, April, 1890.) An infusion was made of each of the drugs containing 10 grams in 250 c.c. A portion of each of them was precipitated with a solution of gelatin and alum, and the precipitate dried between the temperature of 100 and 110° C., then weighed; the *Krameria triandra* yielded 8.4 per cent, while the *Krameria argentea* yielded 7.2 per cent. These estimations were repeated with similar results.

In order to determine the constituents of the two drugs, 50 grams of each were subjected to the usual plant solvents, with the following results:—

	Krameria triandra.		Krameria argentea.	
Petroleum Ether . . . . .	.40	.40	.24)	.240
Ether { soluble in water . . . . .	.53		3.986	
{ soluble in alcohol	3.09		.024	
Total		3.62		4.010
Absolute Alcohol { soluble in water	5.531		3.04	
{ insoluble in water	17.485		9.60	
Total		23.016		12.64
Distilled Water { Tannin	1.360		1.570	
{ Extractive . . . . .	.368		.368	
Total		1.728		1.938
Alkaline Extract { Pectin	1.320		1.500	
{ Extractive	5.490		7.420	
Total		6.810		8.920
Acid Extract { Pararabin . . . . .	.160		.810	
{ Extractive	1.731		.018	
Total		1.891		.828
Boiling Water { Starch . . . . .	.559		.520	
{ Extractive	2.637		1.280	
Total		3.196		1.800
Moisture	11.256	11.256	11.947	11.947
Ash	2.445	2.445	2.785	2.785
Residue Cellulose and Lignin	44.345	44.345	53.118	53.118
Loss	1.2.3	1.293	1.774	1.774
	100.000	100.000	100.000	100.000

The portions that were dissolved by petroleum ether left, after spontaneous evaporation, a crystalline fat. This was treated with absolute alcohol, then the melting points of both were taken; the fats melted at 40° C.

From these experiments it is concluded that the *Krameria argentea*, as found in the market, is a little lower in tannin strength, as well as in other constituents, when compared with the true rhatany.

The properties of the constituents in the two drugs appear to be the same.

The Rhizome of Chamælririum Luteum. H. R. Slack. (*Amer. Journ. Pharm.*, November, 1889.) The author revives the claim of this drug to a place in the materia medica. He considers it to be a tonic vitalizer of the blood with a special tendency to the uterine functions, a fine emmenagogue, and a corrector of all the secretions of the glandular system; and that it is given in doses of ten grains three times a day, or preferably in the form of tincture, one ounce to the pint, which would require about $2\frac{1}{2}$ fluid drachms per dose. The drug has been popularly employed for a long time. Porcher states that the Indian women used this plant in preventing abortion. The drug was examined by Dr. F. V. Greene, in 1870, who ascertained the active principle to be a glucoside, chamælririn, which is a cardiac poison, possessing a depressing and paralyzing effect upon the heart. These researches would seem to indicate that the drug should be used with due caution.

Xanthoxylon Senegalense. P. Giacosa and M. Soave. (*Chem. Zeit. Rep.*, August 10, 1890, 220. From *Pharm. Journ.*) The authors report upon a chemical investigation of the root bark of *Xanthoxylon Senegalense*, or "artar root." The bark, which is described as being 2 to 10 mm. thick, red-brown with bright yellow spots when from young roots, or yellow or greyish yellow from older ones, with a peculiar aromatic odour, and a taste at first aromatic and then acrid and pungent, yielded a fixed oil, a crystalline substance melting at 120°, and three alkaloids. The principal alkaloid, which is named "artarine," and represented by the formula $C_{21}H_{23}NO_4$, was obtained as an amorphous reddish-grey powder, melting with decomposition at 240° C., insoluble in water and benzol, difficultly soluble in chloroform, and soluble in boiling 98 per cent. alcohol, ether, and acetone. It forms salts of a golden yellow colour, the hydrochlorate being slightly soluble in water, and precipitated from alcoholic solution by ether. The second alkaloid was obtained in minute quantity as a white powder, form-

ing a pale yellow crystalline hydrochlorate, soluble with difficulty in water and alcohol. The third alkaloid, occurring in blood-red needles, soluble in water, was not found in all the samples of bark examined. The neutral crystalline substance, separated from a ligroin extract of the bark, was colourless and tasteless, had the composition $C_{10}H_{10}O_3$, or $C_{14}H_{14}O_4$, and resembled cubebin in many reactions, but did not like it yield acetic and protocatechuic acids when fused with caustic potash. Lastly, another nitrogenous substance was obtained, which crystallized in pale yellow needles, but was not alkaline in reaction.

Constituents of *Peucedanum Eurycarpum*. H. Trimble. (*Amer. Journ. Pharm.*, November, 1889.) The author's analysis of the roots of this Indian food plant shows the presence of the following constituents:—

Starch	35.06 per cent.
Albuminoids	9.63 „
Glucose	3.66 „
Saccharose	1.80 „
Mucilage	3.61 „
Resin, etc.	2.68 „
Wax	2.45 „
Volatile Oil	0.02 „
Ash	5.06 „
Moisture	10.30 „
Cellulose	25.73 „

Constituents of *Peucedanum Canbyi*. H. Trimble. (*Amer. Journ. Pharm.*, June, 1890.) The author publishes a report forwarded by V. Havard on this food plant, which is known as *Chucklusa* by the Spokane Indians.

The analysis of the bulbs shows the following composition:—

	Per cent.
Starch	17.02
Albuminoids	3.25
Glucose	1.24
Saccharose	10.66
Mucilage	15.34
Dextrin . . . . .	.40
Resin	2.57
Fat and Wax	2.12
Ash	4.20
Moisture	7.90
Cellulose and undetermined	35.30

Tannin was not found, but a small quantity of chlorophyll appeared to exist in the black epidermis.

Preservation of Rhubarb from Insects. J. C. Sawyer and A. R. Ferguson. (*Pharm. Journ.*, 3rd series, xx. 143.) The results of the authors' experiments indicate that, for manipulating the rhubarb on a large scale, a combination of the heating process and the suffocating process is likely to give the best result. To combine the two processes, the root is first placed in a jacketed iron chamber heated by water to a temperature of 80° or 90° C. for five to ten minutes; it is then immediately placed in a tall wooden cylo or narrow upright case with a movable bottom, and the gas evolved from a pan of burning sulphur blown through it from beneath by means of a revolving fan—the gas escaping from the top into a tall chimney. After about fifteen or twenty minutes of this treatment, the ignited sulphur is removed, and a blast of ordinary air is forced through by the fan for about an hour. The root can then be emptied out by removing the bottom of the cylo, and be packed into cases as usual; or, for further security into zinc-lined cases and soldered down, as the danger of fresh infection would lie in the chance of moths from other parcels depositing their eggs therein.

White Snakeroot. C. H. Blouch. (*Amer. Journ. Pharm.*, March, 1890.) The drug known as white snakeroot is the rhizome, with rootlets, of *Eupatorium aromaticum*. On distilling 5½ lbs. of the drug with water, about 25 grains of volatile oil were obtained, having a strong odour and a pungent taste. The drug, exhausted by cold water, yielded with boiling water a solution which was precipitated by alcohol, and this precipitate behaved like inulin in being coloured yellow by solution of iodine, and when boiled with diluted acid, in being converted into a sugar reducing Fehling's solution. A tincture was prepared with diluted alcohol, and a fluid extract with a mixture of two parts of alcohol and one part of water; on standing a few days, both preparations deposited sediments which, however, have not been examined.

Ophioxylon Serpentinum. M. Wefers Bettink. (*Amer. Journ. Pharm.*, April, 1890.) The author isolated from the root of *Ophioxylon serpentinum*, an apocynaceous plant, used in East India as a purge and anthelmintic, by extraction with chloroform a yellow crystalline principle, which he named ophioxysin. By means of crystallization from hot water and several times from alcohol, it was obtained in needles melting at 72° C., and showing the composition $C_{16}H_{12}O_6$. It is difficultly soluble in water, but easily soluble in chloroform, benzol, carbon bisulphide, and gla-

cial acetic acid. The solution colours the skin first yellow and then brown. On careful heating, ophioxylin sublimes. The yield is about 0·2 per cent. The principle somewhat resembles juglone.

Eupatorium Purpureum. H. Trimble. (*Amer. Journ. Pharm.*, February, 1890.) J. U. Lloyd obtained from the rhizome and rootlets of this plant a yellow neutral crystallized principle, which is stated in the *National Dispensatory* (3rd edit., p. 598) to be probably identical with *quercitrin*. G. H. Ray, who has submitted the drug to an analysis, gives the following description:—

The plant is found growing abundantly in low places, and attains a height of from three to twelve feet, and even more. The rhizome is horizontal, one to four inches long, one-half to three-fourths of an inch in thickness, and with many thin, rather tough rootlets. It is brownish black externally, yellowish internally, and breaks with difficulty. The medulla is darker than the other portions, the odour slight but peculiar, taste bitter, bark thin, and the wood wedges about twenty-six in number, but not as wide as the medullary rays. The rootlets are lighter in colour, four to eight inches long, with a thick, easily removable bark, inclosing a tough central cord.

The drug in very fine powder yielded to petroleum ether 0·89 per cent., consisting of volatile oil, 0·07 per cent., fat melting at 60° to 63° C., 0·53 per cent., and wax melting at 100° C., 0·29 per cent.

Stronger ether extracted only 0·25 per cent. from the residual drug, this was insoluble in water, but consisted of a yellow resin-like uncrystalline substance, which gave negative results with tests applied for quercitrin and quercetin. The melting point of this ethereal extract was 72° C.

From the remainder of the drug absolute alcohol extracted 1·10 per cent., most of which was soluble in water. Both the soluble and insoluble portion failed to respond to any tests for quercitrin or quercetin. Glucosides, alkaloids, gallic and tannic acids were shown to be absent. The portion insoluble in water somewhat resembled the ethereal extract, although it required a temperature of about 100° C. to melt it. Alcoholic solution of lead acetate failed to produce any reaction in an alcoholic solution of this portion not dissolved by water, or in that of the ethereal extract. The remainder of the analysis gave the following results:—

	Per cent.
Volatile Oil	0.07
Fat	0.53
Wax	0.29
Yellow Resin dissolved by stronger Ether	0.25
Soluble in absolute Alcohol	1.10
Mucilage	2.76
Dextrin	2.88
Saccharose	2.04
Glucose	2.29
Albuminoids	1.36
Other organic matter soluble in dilute Alkali	2.34
Calcium Oxalate	1.82
Incrusting substances	5.15
Cellulose and Lignin	54.80
Ash	14.90
Moisture	7.74

A small quantity of organic acid found in the aqueous extract of the drug proved to be citric acid. G. H. Ray concludes by stating that the rhizome is peculiar for the large percentage of cellulose contained in it, and for the small amount of material extracted by the usual solvents, and that the only evidence of a crystalline principle is resin capable of assuming a granular form, but which in no way responds to the tests for quercitrin or quercetin.

The author (H. Trimble) has subsequently succeeded in obtaining this principle in well-defined acicular crystals, which he finds to be identical with those obtained by J. U. Lloyd. His results fully confirm the conclusion that this substance is neither quercitrin nor quercetin. At the suggestion of J. U. Lloyd, the author proposes for this body the provisional name "*Euparin*."

The Root Bark of *Euonymus* (Wahoo) and *Euonymin*. W. A. H. Naylor and E. M. Chaplin. (*Pharm. Journ.*, 3rd series, xx. 472.) In a paper entitled "Chemical Observations on the Root Bark of *Euonymus*," read at the Newcastle meeting of the British Pharmaceutical Conference (*Year-Book of Pharmacy*, 1889, p. 405), the authors drew attention to a constituent which they described, under the provisional name of "atropurpurin," as a white crystalline body possessed of glucosidal properties, and having a fixed melting point of 182° C. Subsequently they found that the substance reported upon was not quite free from impurity, and they therefore prepared a larger quantity of it for further examination. The product was purified by precipitating it from its strong aqueous solution by means of alcohol, the process being repeated

several times, when it proved to be quite pure. This sample, when examined, was found to agree with that obtained previously, with the one exception that, after being boiled for three hours with a 2 per cent. aqueous solution of sulphuric acid, it failed to reduce Fehling's solution. Combustions of this substance with fused chromate of lead gave the following numbers: C=39.12, H=7.81, and O=53.07 per cent. These results, taken in conjunction with the characters previously enumerated, are regarded by the authors as proof that the body is either identical with, or an isomer of dulcite, a view which agrees with an impression recently expressed by D. Hooper.

The authors have recently examined a few specimens of *eunonymin*, such as may be regarded as fairly representative of the different makes supplied by wholesale druggists. The results were as follows:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Moisture p.c.	4.10	4.70	4.90	8.10	This sample was entirely soluble in cold water, and consisted of the aqueous extract of the bark diluted with powdered liquorice.
Organic matter p.c. . . .	59.52	72.70	71.46	78.85	
Ash soluble in water p.c. .	2.21	12.50	2.72	6.20	
Ash insoluble in water p.c.	34.17	10.10	20.92	6.85	
Silica p.c.	7.12	3.20	3.43	1.57	
Portion extracted with—					
(1) Cold water p.c.	25.20	55.60	14.18	56.26	
The marc then treated with—					
(2) Proof spirit p.c.	10.58	2.48	12.25	2.60	
and finally with—					
(3) Rectified spirit p.c. . . .	8.49	3.58	14.74	1.03	

No. 1. The insoluble matter consisted mainly of carbonate of barium. The proof spirit extract was chiefly composed of yellow resin, and was slightly bitter to the taste. The rectified spirit residue consisted of fair proportions of brown resin and free fatty acids, and was markedly acid. Both extracts were of a green colour.

No. 2. The insoluble matter was chiefly alumina. The product obtained by treatment with proof spirit consisted chiefly of yellow resin, and was distinctly bitter. That obtained by rectified spirit, coloured bright green, was oily and markedly acid, and contained a small proportion of brown resin.

No. 3. The insoluble matter was mainly composed of carbonate of barium, together with salts of lime. The proof spirit extract

was of a dull green colour, friable and faintly bitter, and contained yellow resin. Rectified spirit yielded a bright green oily extract, free from acidity, and containing a good proportion of brown resin.

No. 4. The insoluble portion consisted of salts of iron, alumina, and lime. The proof spirit extract was composed chiefly of yellow resin, which was coloured bright green, having an extremely bitter taste. The rectified spirit extract contained free fatty acids, and was devoid of bitterness, but faintly acid.

In the next place the authors discuss the question as to the best solvent for extracting from Wahoo bark those principles upon which its reputation as a hepatic stimulant is founded. From the results of experiments made in this direction, they infer that while the aqueous extract of this drug may or may not possess valuable medicinal properties, its power to act as an intestinal or hepatic stimulant resides somewhere in the resinous and free fatty acid principles, which require for their removal alcohol of a strength not much below 65 per cent. Proceeding upon these lines, they have prepared a liquid extract of the drug, which they recommend for adoption by pharmacists.

Extractum Euonymi Liquidum. (Liquid Extract of Euonymus.)

Take of—

Euonymus Bark in No. 20 powder . . . 20 ounces.

Rectified Spirit,

Distilled Water. . . of each a sufficient quantity.

Moisten the powder with 8 fluid ounces of a mixture of four volumes of rectified spirit and one volume of distilled water. Pack tightly in a percolator, and pour on sufficient menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop, close the lower orifice and macerate for forty-eight hours; then allow percolation to proceed, gradually adding menstruum until the euonymus is exhausted. Reserve the first 17 fluid ounces of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the liquid extract measure 1 pint.

Dose: 15 to 60 minims.

The authors are also of opinion that in the preparation of *euonymin* a weaker alcohol than 65 per cent. should not be used, and that the drug should be exhausted with water and dried prior to its percolation with this menstruum. The final product obtained after distillation of the spirit and desiccation of the residue,

when mixed with an equal weight of sugar of milk, will be found to contain sufficient of the brown resin to powder with ease. The dose is from $\frac{1}{2}$ to 2 grains.

Rhamnus Frangula and Rhamnus Purshiana (Cascara Sagrada). E. R. Squibb. (*Ephemeris*, July, 1889, 1244.) The author believes that the bark of *Rhamnus frangula* is likely to prove a better agent, and to prove far more uniform in quality than that of *R. purshiana*. It is always obtainable in quantity, being a by-product in the manufacture of gunpowder, the wood being used for charcoal. As regards cascara sagrada, the author adds that there is no longer any scarcity of this bark.

Active Constituents of Rhamnus Purshiana (Cascara Sagrada). A. C. Zeig. (From a paper read before the San Francisco meeting of the Pharmaceutical Association. *Pharmaceutical Era*, August, 1889.) The author has isolated the three resins contained in this drug, and has studied their physiological action. He finds two of them to be inert, while the third possesses the purgative properties of the bark, 5 grains of it having a marked laxative effect upon an adult. This active resin may be obtained as follows:—

Rhamnus Purshiana, No. 40 powder	8 ounces.
Dilute Alcohol,	
Water	each q. s.
Hydrochloric Acid	2 fl. drachms.

Moisten the powder with 8 fluid ounces of dilute alcohol, and pack it firmly in the cylindrical percolator, add enough dilute alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed, gradually adding dilute alcohol, until 12 fluid ounces of percolate are obtained, or until it produces but a slight turbidity when dropped into acidulated water. Evaporate off the dilute alcohol upon a water bath until the percolate is reduced to a syrupy consistence, and pour it slowly, with constant stirring, into 8 fluid ounces of water containing the hydrochloric acid. Let it stand until the precipitate has subsided, then decant the supernatant liquid, and wash the precipitate three times by decantation with fresh portions of cold water. Spread it on a strainer, and having pressed out the liquid, dry the resin by exposure to air at a gentle heat.

The resin thus prepared is contaminated by the bitter decomposition product of the tasteless glucoside observed by Meier and

Webber, to which they attributed tonic properties. This resin dissolves in potassium hydrate, giving an intense purple colour, which disappears upon acidulating with hydrochloric acid, when the resin is again precipitated, and may in this manner be obtained devoid of bitterness. This being the case, and in view of the fact that the glucoside is in itself not bitter, but is the source of the bitter principle when treated with acids, the authors consider it quite possible to obtain a preparation of cascara sagrada quite free from taste, and yet containing all the active constituents to which both laxative and tonic properties are due.

Note on a True Cinchona Bark containing Aricine in the entire absence of Quinine and Cinchonine. H. Moissan. (*Chemist and Druggist*, March 8th, 1890.) The author received a Peruvian bark in quills, much resembling Jaen cinchona, and on examining it found it to contain no trace of either quinine or cinchonine, but a good percentage of aricine with a very small proportion of another alkaloid. The aricine was separated by the usual process of exhaustion with ether in presence of an alkali, and purified by repeated treatment with acid, alkali, and ether, and final crystallizations from alcohol. The product was obtained in colourless crystalline needles, rapidly becoming yellow by exposure to light, especially when in alcoholic solution. Its physical and chemical properties were found to conform to the descriptions already given by Pelletier. About two kilos. of the product have been secured for further investigations now in progress.

Analysis of Cinchonas. E. Landrin. (*Comptes Rendus*, cviii. 750-753; *Journ. Chem. Soc.*, August, 1889.) The experiments were made with *Cinchona (quina) succirubra*, which is cultivated in Java by the Dutch Government.

Three hundred grams of the finely powdered bark is mixed with 75 grams of calcium oxide suspended in water, and 75 grams of a solution of sodium hydroxide of 40° B. The use of both alkalies is essential to complete extraction of the alkaloids, 2 litres of petroleum is then added, and the mixture heated at 100° for about twenty minutes with continual agitation. The petroleum is decanted off, and the residue treated in a similar manner with a second quantity of 2 litres. The 4 litres of oil is then agitated for ten minutes with 75 c.c. of a 10 per cent. solution of sulphuric acid, and 150 c.c. of water, the acid liquid decanted off, and the treatment repeated with the same quantities, and a second time with half the quantities. The first and second acid solutions are heated to boiling, and neutralized with ammonia, in order to pre-

precipitate the resins, and the third acid liquid, which is used to wash the filter in the first operation, is treated in a similar manner. When the neutralized liquids cool, they deposit, in the form of sulphates, about 90 per cent. of the alkaloids present in the bark. The mother-liquors are precipitated with sodium hydroxide, and the precipitate is treated with just sufficient dilute sulphuric acid to convert it into sulphate. The sulphates are weighed together, and the different alkaloids separated in the usual way. The *Cinchona succirubra* examined contained:—total alkaloids, 7.592 per cent.; crystallizable salts, 5.183 per cent.; quinine sulphate, 2.127 per cent.

Water dissolves from the bark the greater part of the acid principles which it contains; alcohol is about equally efficient, but, contrary to the usual statement, it was found that dilute hydrochloric acid dissolves a slightly smaller quantity.

Panbotano as a Substitute for Sulphate of Quinine. M. Valude. (*Bull. Méd.; Nouveaux Remèdes*, March 8, 1890; *Amer. Journ. Pharm.*, April, 1890.) This medicament consists of the bark of the panbotano, which is a leguminous tree (sub-order *Mimosæ*) of Mexico, isolated plants being cultivated in some parts of Europe. M. Villejean has studied the bark, and found fatty matters, tannin, etc., but no alkaloid or glucoside. The author administered panbotano bark to his patients in form of an alcoholic tincture, and also gave a preparation made by maceration. He preferred the latter, which he made by putting 70 grams of bruised bark into a quart of water, and boiling down to a pint, this being the quantity to be taken in twenty-four hours. In the eight paludic cases described by him, a single dose, or at most two doses, caused the disappearance of well-defined tertian fevers.

Bark of Quina Morada (*Pogonopus Febrifugus*). P. N. Arata and F. Canzoneri. (*Gazzetta*, xviii. 409–421; *Journ. Chem. Soc.*, April, 1890.) The authors have examined a specimen of bark found in Bolivia and in the north of the Argentine Republic, commonly known as “quina morada,” and credited with many of the therapeutic characteristics of the true cinchona bark. For a variety of reasons, the authors consider it to belong to the *Pogonopus febrifugus*, syn. *Howardia Wedd*, *rubicea*, described by Grisebach. In appearance the bark is irregular on the outside, and scaly within; the colour varies from yellowish white to reddish, and is a dirty white on freshly exposed surfaces; it is soft and spongy to the touch, a little lighter than water, has a slightly bitter taste, scarcely any odour, and burns very readily, leaving a white ash.

It imparts a bluish fluorescence to water with which it has been boiled, and a yellowish-blue fluorescence to alcohol.

Two substances were extracted from this bark, namely, a blue fluorescent substance, moradin, and an alkaloid, moradeine.

To isolate these, the powdered bark is extracted with alcohol, the extract treated with an alcoholic solution of lead acetate, filtered, freed from lead, and concentrated, when a crystalline deposit of moradin is obtained. The mother-liquor is then treated with potash and ether, the ethereal extract treated with hydrogen chloride, and the precipitate of moradeine hydrochloride purified by again treating it with soda, ether, etc.

Moradin contains no nitrogen, and its formula is either $C_{21}H_{18}O_8$, or $C_{16}H_{14}O_6$. The former agrees better with the composition of the acetyl derivative, triacetylmoradin.

Moradin crystallizes in slender colourless needles, or in large anhydrous prisms, and melts at $201-202^\circ$. It has the character of an acid, but none of its salts could be isolated. Alkalies increase, and acids (except acetic) diminish, the fluorescence of its solutions. Ferric chloride gives a green coloration and, after a time, a green precipitate; gold chloride gives a blue coloration and green precipitate. It is dissolved by concentrated sulphuric acid, forming a yellow solution, from which it is reprecipitated unchanged on adding water. Although not a glucoside, it reduces Fehling's solution when heated with it; it also reduces silver nitrate and basic lead nitrate. Potassium permanganate in alkaline solution and ferric chloride in alcoholic solution oxidize it to quinone. The action of nitric acid is characteristic; the concentrated acid has no action in the cold, but forms oxalic acid on heating; on boiling with very dilute (four per cent.) acid, quinhydrone and quinone are successively formed. Its reactions place it in the class of oxyhydroquinones, since it gives as products of decomposition a di- or tri- hydroxybenzoic acid which colours ferric salts green, a polyvalent phenol, probably hydroxyquinol, and quinone. It is probable that two of the oxygen-atoms are contained in the same way as in hydroxycoumarin (umbelliferon).

Triacetylmoradin crystallizes from its alcoholic solution in white shining prisms which melt at $177-178^\circ$. It is not fluorescent, and has no acid properties. It is insoluble in alkalies in the cold, and decomposes when warmed with them.

Moradeine crystallizes in opaque, colourless prisms, very soluble in alcohol, ether, chloroform, etc., but only slightly in water. It melts at $199-200^\circ$, and exhibits the general reactions of an alka-

loid, forming a well crystallized platinochloride and aurochloride, etc.

The Crystalline Principle from Xanthoxylum Fraxineum. J. U. Lloyd. (*Amer. Journ. Pharm.*, May 1890.) The author arrives at the conclusion that the crystalline principle described under the name of xanthoxylin is therapeutically inert, and that its name is therefore inappropriate. He feels sure, however, that xanthoxylum bark contains substances of marked activity, and thinks that the constituent deserving the name xanthoxylin, which still requires to be isolated, will prove to be amorphous.

Xanthoxylum Naranjillo. M. Parodi. (*Amer. Journ. Pharm.*, April, 1890.) This plant is used as a sudorific and diuretic in the Argentine Republic. The author has found in it a volatile oil and an alkaloid.

True Winter Bark. P. N. Arata and F. Canzoneri. (*Gazzetta*, xviii. 527-539; *Journ. Chem. Soc.*, April, 1890.) After an historical summary of the introduction of the bark into Europe, the authors describe the genuine bark from the Straits of Magellan; this occurs in the form of deeply furrowed, curled-up fragments with an earthy fracture, exhibiting, when in small pieces, an internal reddish-brown coloration. When fresh, it has a bitter and pungent taste and an agreeable odour, recalling both turpentine and cloves. The sun-dried bark yielded: water at (110°) 13.713 per cent.; ash, 3.338 per cent.; soluble in ether, 3.841 per cent.; in alcohol, 6.465 per cent.; in water, 13.981 per cent.; ligneous matter, 49.200 per cent. An analysis of the ash is also given. The ethereal solution contains a peculiar essence, fatty compounds, resins, and waxy matter; the alcoholic extract contains reddish, uncrystallizable resins. Citric acid was carefully looked for, but not found. The essence was isolated by distilling the bark with water, exhausting the distillate with petroleum, and distilling off the solvent. The crude oil, amounting to 0.6428 per cent. of the weight of the bark employed, is a mixture of several substances.

Winterene, $C_{15}H_{24}$, is the essential oil separated from this by fractional distillation. It passes over between 260° and 265°; sp. gr. at 13° = 0.93437. Index of refraction = 1.4931; sp. rotatory power at 16° $[\alpha]_D = 11.2$. It is readily oxidized on exposure to the air, becoming yellow. The formula $C_{25}H_{40}$ was calculated from the ultimate analysis and vapour density, but the authors consider that the ready oxidizability of winterene and its analogy to similar essences point rather to the formula $C_{15}H_{24}$, which would place it

in the group of sesquiterpenes, such as cedrene, cubebene, etc., the boiling points of which are between 250° and 268°.

Iodine dissolves in winterene, producing a greenish-yellow coloration, which changes to green after a time.

On adding picric acid containing a few drops of sulphuric acid to winterene, a yellowish-red, crystalline compound is formed.

Pure winterene is coloured green by a solution of bromine in chloroform, orange red by a solution of chloral hydrate in sulphuric acid, rose to yellow by concentrated sulphuric acid or by sulphuric acid and chloroform, dirty yellow by Fröhde's reagent and by ferric chloride and sulphuric acid, rose to violet by nitric acid.

The reactions of the essence after oxidation are also given.

Cephalanthus Occidentalis. E. Claassen. *Chem. Centr.*, 1889, ii. 258.) The bark of *Cephalanthus occidentalis* ("button bush" or "swamp dog-wood"), a bush belonging to the Cinchoneæ, contains a saponin-like substance having a bitter taste and tanning properties. For its separation, the bark is digested with lime, the filtrate treated with carbonic anhydride, and the cephalanthin precipitated from the solution by hydrochloric acid and purified by treatment with alcohol and ether. It is amorphous, sparingly soluble in cold and hot water, readily soluble in alcohol and ether, and has the properties of an acid. When warmed with nitric acid, it gives a yellow coloration, and with concentrated sulphuric acid an orange coloration changing to reddish brown. Dilute sulphuric acid seems to split up cephalanthin with formation of sugar.

Cocillana, a New Expectorant. R. W. Wilcox. (*Chemist and Druggist*, January 25, 1890.) This bark, derived from a species of guarea, discovered in Bolivia in 1886 by H. H. Rusby, is recommended by the author as an expectorant. A concentrated tincture, given in doses varying from ʒss. to ʒij., in cases of acute and chronic bronchitis, was found to have a most satisfactory expectorant action. The effect is produced after from three to six hours, the expectoration becoming more watery and the cough easier. The drug appears to act by stimulating the muciparous glands, and the author considers that it is to be preferred to ipecacuanha, in that it does not readily cause nausea when given in doses sufficient to produce the expectorant effect.

Robinia Pseudacacia. F. B. Power and J. Cambier. (*Pharm. Rundschau*, February, 1890.) The bark of the locust tree, *Robinia pseudacacia*, has been examined by the authors with the view of determining the principle to which its reputed poisonous properties are due. About 2 per cent. of fat and resin was obtained; also

some cane sugar, colouring matter, gum, a little tannin and probably asparagin. The presence of much starch was demonstrated by the micro-chemical test; but a decoction of the bark, after cooling, is merely coloured brown; the principle preventing the appearance of the blue colour has not been determined. The bark contains a small amount of an alkaloid, which was shown to be identical with *choline*. Neurine was not present; and when a kilogram of the bark had been allowed to undergo fermentation, a sufficient amount of basic substances could not be obtained to determine their character. The authors then turned their attention to the albuminoid substances, and succeeded in isolating a globulin and an albumose, of which the latter produced purging and vomiting. This *phyt. albumose* is tasteless, soluble in water, and coagulated and rendered inert by heat. It is precipitated by potassium-bismuth iodide and by tannin, and from its acidulated solutions by potassium ferrocyanide.

Pichi (*Fabiana Imbricata*). H. Trimble and H. J. M. Schroeter. (*Amer. Journ. Pharm.*, 1889, 405.) Owing to the conflicting statements published with reference to the constituents of this plant, the authors have re-examined the wood and bark. Like Nivière and Liotard, they have failed to find any alkaloid, but confirm the presence of a fluorescent glucosidal principle. They have also obtained a crystalline, neutral, inert resin, the composition of which corresponds to the formula $C_{18}H_{31}O_2$.

Constituents of *Quassia Amara*, and *Picræna Excelsa*. F. Massute. (*Archiv der Pharm.* [3], xxviii. 147-171. From *Journ. Chem. Soc.*) The coarsely powdered drug *Quassia amara* was digested three times with alcohol of 50 to 60 per cent., the liquids mixed and treated with a little freshly burnt magnesia, a little acetic acid added if necessary to produce a slight acid reaction, and the solution filtered, after which the alcohol was expelled at the lowest possible temperature. The aqueous solution thus obtained was warmed gently in an open dish, and the water was replenished from time to time, so as to get rid of all alcohol. On cooling, the separated resin was removed, and the liquid repeatedly shaken up with chloroform. From the separated chloroform solution, the chloroform was distilled off, and the residue treated with a mixture of absolute alcohol and ether; this was evaporated and the residue was dissolved in absolute ether, which, on slow evaporation, gave crystals of quassiin, which further treatment with ether and alcohol rendered quite pure. This process insures the isolation of the bitter principle actually existing in the plants, and avoids the

formation of decomposition products. Repeated recrystallization of the product led to the separation of four compounds differing in their solubilities and melting points. The melting points were 210–211°, 215–217°, 221–226°, and 239–242°. The first and last compounds could not be further examined owing to the lack of material; but the former agrees with the quassiin obtained by first boiling the wood with water, as in Christensen's extraction method, and in crystalline form and melting point is the same as that observed by Wiggers, and by Oliveri and Denaro. Quassiin, melting point, 215–217°, on analysis gave $C_{35}H_{46}O_{10}$ and that with melting point 221–226° gave $C_{37}H_{50}O_{10}$. The bitter principle, picrasmin, obtained as above from *Picraena excelsa*, melted at 206–208°, and was a mixture of two varieties melting at 204° and at 209–212° respectively. Some commercial crystalline material was purified, and the two varieties were readily isolated; that melting at 204° was found to have the formula $C_{35}H_{46}O_{10}$, whilst the other gave $C_{36}H_{48}O_{10}$. It is probable that quassiin and picrasmin are not identical, but form two series of homologous compounds. To elucidate this point, some of the decomposition products of picrasmin were studied. Hydrochloric acid in a closed tube with picrasmin produced *picrasmic acid*; the barium salt of this acid was analysed and showed the acid to be bibasic; its formation may be thus represented:—



Zeisel's reaction, in which picrasmin is treated with fuming hydriodic acid in a current of carbonic anhydride, shows that three methoxyl groups are present, but only two of these were attached to carboxyl, as shown by treatment with hydrochloric acid. Quassiinic acid, $C_{30}H_{38}O_{10}$, obtained by Oliveri and Denaro, and picrasmic acid, $C_{33}H_{42}O_{10} + 5H_2O$, obtained by the author, strengthen the view of the non-identity of quassiin and picrasmin.

Constituents of *Picrasma Quassioides*. W. Dymock and C. J. H. Warden. (*Pharm. Journ.*, 3rd series, xx. 41.) The author's experiments indicate that the wood of *Picrasma quassioides* contains a crystallizable principle, probably quassiin, a fluorescing bitter, resin-like principle, and at least one other non-crystallizable, bitter, resinous body, probably the uncrystallizable quassiin of Adrin and Morecaux. The wood is not so bitter to the taste as ordinary quassia wood. The authors of the "Pharmacographia" state that they obtained 7·8 per cent. of ash from quassia wood dried at 100° C.; while the ash of *P.*

quassioides obtained by the authors amounted to only 1·7 per cent. A watery solution of ordinary quassia wood is stated to display a slight fluorescence, especially if a little caustic lime has been added. According to Flückiger and Hanbury this is apparently due to quassiin. The authors have repeated the experiment with a sample of ordinary quassia wood, with negative results. The *P. quassioides* wood, when treated with water or alcohol, affords solutions which display a very marked greenish fluorescence. The proportion of quassiin appears to vary considerably. A. Christensen states that he found the amount to vary greatly, some specimens yielding scarcely any. Stillé and Maisch give the yield at 0·15 to 0·05 per cent. The authors of the "Pharmacographia" at about 0·1 per cent. Adrin and Morceaux obtained 0·125 to 0·15 per cent. of white crystalline quassiin. Oliveri and Denaro obtained only 0·03 per cent. of the pure principle; while Goldschmiedt and Weidel, in 1877, failed to isolate quassiin. They obtained a yellow resin, the presence of which had been previously noticed in the wood by Flückiger and Hanbury. The authors do not consider that the proportion of crystallizable principle in the wood they examined would amount to more than ·02 to ·03 per cent. as an outside limit. Regarding the method of analysis, the best result, as far as the crystalline principle is concerned, appears to be obtained by extracting the wood by alcohol, boiling of the dry alcoholic extract with water, concentrating, and precipitating with tannin.

Tumbeki (*Nicotiana Persica*). A. E. Robinson. (*Nouveaux Remèdes*, 1889, 546.) The author classes this drug with intestinal convulsants, such as calabar bean and nux vomica. He finds it liable to produce pulmonary catarrh, and to give rise to cardiac hypertrophy by diminishing the inhibitory action of the vagus nerve.

Vaccinium Macrocarpon. E. Claassen. (*Amer. Journ. Pharm.*, May, 1890.) The author has examined the leaves of the American cranberry (*Vaccinium macrocarpon*), and has established the presence of kinic acid in the same.

Anemone Cylindrica and Anemone Multifida. F. W. Anderson. (*Bot. Gaz.*, 1889, 229.) The author states that the leaves of these two plants are used by the Indians of the Rocky Mountains for nasal and pharyngeal catarrh. The leaves are gathered before the seeds are quite ripe, dried, and reduced to a fine powder. The powder so prepared, when used as snuff, produces a stinging sensation, makes the eyes water, and taken in sufficient quantity

produces violent fits of sneezing. When these symptoms have subsided, the throat and nostrils become free, and have a comfortable feeling. The leaves are also broken small, and smoked, the smoke being expelled through the nostrils for the same purpose. The juice of the fresh leaves is hot to the taste, and is sometimes rubbed into the nostrils instead of the snuff being taken.

Constituents of the Leaves of *Verbascum Thapsus*. A. Latin. (*Amer. Journ. Pharm.*, February, 1890.) The author submitted the leaves of *Verbascum thapsus* to proximate analysis, and found the constituents to be .80 per cent. of a crystalline wax, a trace of volatile oil, .78 per cent. of resin soluble in ether, 1.00 per cent. of resin insoluble in ether but soluble in absolute alcohol, a small quantity of tannin, a bitter principle, sugar, mucilage, and the other usual constituents. The moisture in the air-dried sample amounted to 5.90 per cent., and the ash to 12.60 per cent. The bitter principle may be prepared by exhausting the drug with alcohol, evaporating or distilling the solvent, dissolving the residue in water, and agitating with ether or chloroform. Several trials failed to secure this substance in a crystalline condition. It was found to be soluble in water, ether, alcohol, and chloroform, and to possess a decidedly bitter taste. It responded to none of the tests for a glucoside or alkaloid.

Constituents of *Urtica Urens*, *Urtica Dioica*, and *Urtica Pilulifera*. L. Reuter. (*Pharm. Centralhalle*, 1889, 609.) The leaves of *Urtica urens* and *Urtica dioica* failed to yield any alkaloid; but they yielded a neutral non-nitrogenous glucoside, forming no precipitate with tannin, sodium chloride, or alkali, but producing precipitates with iodo-iodide of potassium, potassio-mercuric iodide, platinum chloride, mercuric chloride, palladium chloride, and phosphotungstic acid. It reduces potassium ferrieyanide and potassium chromate in the presence of sulphuric acid. The seeds of *Urtica pilulifera* also yielded a glucoside, and a green, fatty oil, rich in chlorophyll.

Constituents of *Ambrosia Artemisiæfolia*. L. W. Schwab. (*Amer. Journ. Pharm.*, February, 1890.) This plant is popularly known as ragweed, hogweed, or bitterweed. It is indigenous to all parts of the United States. Its average height is from two to three feet. All parts of the plant are very bitter, hence the common name. The material for analysis, consisting of the leaves and smaller stems, was gathered in August.

The bitter principle was found to be a glucoside, which was partly dissolved from the plant by ether, but more completely by

alcohol. On recovering the solvent, dissolving in water, and agitating with ether or chloroform, the bitter glucoside was obtained in an amorphous condition. The following is a summary of the other constituents found:—

	Per cent.
Volatile Oil	0·10
Fat melting at 60° C.	1·80
Wax melting at 68° C.	0·08
Resin, Chlorophyll, and Glucoside.	2·78
Gum and Mucilage	1·61
Dextrin and Glucose	2·89
Saccharose	1·97
Albuminoids	1·87
Pectin	2·42
Incrusting substance	17·78
Lignin and Cellulose	51·19
Ash	9·25
Moisture	6·26

The Cultivation of Medicinal Plants in Cambridgeshire. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xx. 122.) The author reports favourably on the success attending the cultivation of aconite in Cambridgeshire. The leaves of the plants were of a full dark green, and the flowers of a deep blue colour. The helmet was not quite so semicircular as in the typical *Aconitum Napellus*, and the inflorescence showed a general tendency to branching. The whole of the plants, however, manifested a remarkable uniformity, were of very robust growth, and were flowering at the proper date, and the leaves possessed the characteristic taste of aconite. Owing to this uniformity, the author thinks that the roots obtained from these plants would be far more dependable than the foreign root, either for use in medicine or for chemical analysis.

The author's report also refers to henbane, belladonna, and foxglove grown in the same neighbourhood. For particulars, reference should be made to the original paper.

The Alkaloidal Constituents of Chelidonium Majus. E. Schmidt. (*Pharm. Zeitung*, 1889, 582.) In addition to chelidonine ($C_{20}H_{19}NO_5 + H_2O$) and chelerythrine, the author has obtained from the root of this plant a considerable number of other alkaloids which are being investigated. The chelidonium bases appear to resemble morphine in their physiological action. The identity of stylophorine (from the root of *Stylophorum diphyllum*) with chelidonine is confirmed.

Cannabis Indica. J. Russell Reynolds. (*Lancet*, March 22, 1890.) The author directs attention to the value of *Cannabis indica* as a remedy in facial neuralgia, migraine, and some forms of epileptic attacks. He prefers the tincture to the extract, and advises small doses to be given to commence with, owing to the uncertain and variable action of the drug.

Cannabis Indica. C. Lawrence. (*Lancet*, 1890, 824.) The author directs attention to the uncertainty of the action of *Cannabis indica*, which is attributed to variation in the plant. He points out the necessity of care as to dose at the onset; and if this be done, he considers it a valuable sedative and hypnotic in cases of renal disease, senile chorea and paralysis agitans, menorrhagia, migraine, persistent headache, and allied conditions.

Lobelia Inflata. H. Dreser. (*Arch. exp. Path. u. Pharmacol.*, xxvi. 237.) The results recorded by the author are not in accord with those of previous investigators. He considers lobeline the only active constituent of the drug, and describes this principle as a non-volatile alkaloid yielding partly an amorphous and partly a crystalline platinum salt.

Parthenium Hysterophorus. H. Vin Arny. (*Amer. Journ. Pharm.*, March, 1890.) This plant is found in waste places in the West Indies, Northern Patagonia, and Southern United States, especially in Florida and Louisiana. It is characterized by its extreme bitterness, due, as shown by the author, to a glucoside which was extracted from the drug by alcohol, the alcohol recovered and the residue dissolved in water. This aqueous solution yielded the glucoside to chloroform by agitation with that liquid, from which it separated as a brown amorphous mass.

The author concludes that this glucoside is so-called *parthenine* (see Proc. Amer. Pharm. Association for 1885 and 1886), which was originally supposed to be an alkaloid. The drug is much esteemed in the West Indies, where it is used in place of quinine.

Lycopus Virginicus. J. L. Weil. (*Amer. Journ. Pharm.*, February, 1890.) The author has analysed this plant, and found it to contain 0.41 per cent. of a fat melting at 50° C., 0.68 per cent. of a granular wax melting at 70° C., a small amount of gallic acid, 0.43 per cent. of a crystallizable resin soluble in ether, chloroform, benzol, and slightly soluble in 95 per cent. alcohol, a small quantity of tannin, a crystallizable glucoside, and the usual plant constituents.

The crystalline glucoside may be obtained by extracting the drug with ether, recovering the solvent and treating the residue

with water, which dissolves the glucoside, and from this solution it may be removed by agitation with ether. The glucoside decomposes so readily that it is difficult to obtain it pure, the products of decomposition being an amorphous resin-like body and glucose.

The crystalline resin can be obtained in the same extraction with ether. After the removal of the glucoside from the ethereal extract by water, the resinous residue, when dissolved in hot absolute alcohol, will, in part, deposit as crystals, which soften at 113° C., but refuse to melt at 200° C.

The drug is used almost exclusively by the eclectics.

Solidago Virgaurea. Dr. Mascarel. (*La France médicale*, October 8, 1889.) The author reports very favourably on the merits of this plant in the treatment of cardiac dropsy. The dried stems, leaves, and flowers are reduced to a coarse powder, and given in doses of one tablespoonful, beaten with an entire egg (yolk and white). Only one dose is given on the first day, but on each of the following days a tablespoonful is added, until seven or eight doses are being taken during the twenty-four hours. The diuresis is said to continue until œdema permanently disappears.

Nepeta Cataria. C. O. Myers. (*Amer. Journ. Pharm.*, November, 1889.) The author's examination of this Labiaceous plant shows it to contain .3 per cent. of volatile oil, small quantities of fixed oil, a crystalline wax, 5.80 per cent. of mucilage, 12.62 per cent. of dextrin and glucose, 1.30 per cent. cane sugar, 35.44 per cent. cellulose, 12.50 per cent. ash, and small quantities of a bitter principle.

Scutellaria Lateriflora. C. O. Myers. (*Amer. Journ. Pharm.*, November, 1889.) This member of the *Labiatae* enjoys some reputation as a nervine, and has also been suggested in the treatment of hydrophobia. It was analysed in 1824 by C. de Gassicourt (*Journ. de Pharmacie*, vol. x. p. 439), who found traces of a bitter principle, a partly volatile material soluble in alcohol and water, which was not apparent in the original drug, but appeared to be developed by chemical action, volatile oil, a yellow fixed oil, tannin, mucilage, sugar, etc. The author obtained a bitter principle, which was partly removed from the drug by petroleum ether and ether, but completely by alcohol. On removing the alcohol, dissolving the residue as far as possible in water, agitating the aqueous solution with ether, and evaporating this ethereal solution, the bitter principle was obtained in the form of stellate groups of acicular crystals.

An aqueous solution of these crystals did not reduce Fehling's

solution, but on boiling with a few drops of hydrochloric acid, an aromatic odour was developed, and then on neutralizing and testing with the above reagent, evidence of sugar was found, showing the compound to be a glucoside. This appears to be the bitter principle noticed by C. de Gassicourt, although it was obtained in larger quantity than found by him. The partly volatile material observed by the above investigator was not found, unless he referred to the odour developed on boiling the glucoside with acid.

The other more important constituents found, were traces of volatile oil, mucilage, 4.20 per cent.; dextrin, 2.90 per cent.; glucose, 2.42 per cent.; ash, 14.00 per cent.; cellulose and allied bodies, 55.28 per cent.

Constituents of *Anisodus Luridus*. C. Siebert. (*Archiv der Pharm.* [3], xxviii. 145, 146.) This plant, belonging to the *Solanaceæ*, is found in the Himalayas. The plant in flower yielded a not inconsiderable amount of hyoscyamine aurochloride, whilst the plant taken after the ripening of its seeds yielded only a minute quantity of atropine aurochloride, and no hyoscyamine aurochloride. The fresh flowering plant gave neither atropine nor hyoscyamine.

***Eschscholtzia Californica*.** L. Reuter. (*Pharm. Zeitung*, 1889, 635.) The author confirms the presence in this papaveraceous plant of two alkaloids and a glucoside. One of these alkaloids gives an intense violet coloration with sulphuric acid. Both bases are found to be essentially different from morphine; and the statement recently made by Adrian and Bardet (*Year-Book of Pharmacy*, 1889, p. 153), that this plant contains an alkaloid possessing all the characters of morphine, is therefore not confirmed.

***Gnaphalium Polycephalum*.** E. S. Smythe. (*Amer. Journ. Pharm.*, March, 1890.) The author obtained the odorous principle of *Gnaphalium polycephalum* by distilling the drug with water. This substance, of semi-solid consistence, was diffused through the aqueous distillate, from which it was removed by agitation with ether. It was of a light green colour, and possessed the peculiar odour of the drug to a considerable degree. The drug was found to contain 7.9 per cent. of moisture and 5.7 per cent. of ash. Extraction with the usual solvents failed to yield any unusual plant constituents.

***Azalea Viscosa*.** H. C. Haak. (*Amer. Journ. Pharm.*, March, 1890.) The author found a crystalline principle in the petroleum ether extract of *Azalea viscosa*. The residual extract, after recovering the petroleum ether, was dissolved in absolute alcohol

boiling hot, and this solvent deposited crystals on cooling. The crystals were purified by re-solution in absolute alcohol and treatment with animal charcoal.

Euphrasia Officinalis. G. M. Garland. (*Bost. Med. Surg. Journ.*, 1889, 453.) The author confirms the value of this drug in the treatment of fresh colds. The remedy was used in the form of a tincture, which in ten-drop doses in water is described as exercising a powerful action upon the recently inflamed mucous membrane of the nose and pharynx, reducing the secretion in a very short time. The tincture is said to have been found specially useful in the acute coryza of infants.

Useful Plants of the Genus Psoralea. J. M. Maisch. (*Amer. Journ. Pharm.*, July, 1890.) This paper contains notices of the following species:—*P. castorea*, *P. mephitica*, *P. esculenta*, *P. glandulosa*, *P. bituminosa*, *P. physodes*, *P. melilotoides*, *P. pentaphylla*, and *P. corylifolia*. For particulars reference should be made to the above source.

Primula Obconica. (*Garden*, 1889, 368.) The handling of this favourite greenhouse plant has been observed to cause troublesome inflammation of the face and hands. Whether this is due to a volatile acrid principle or to irritation by hairs, remains yet to be decided.

Development and Localization of Alkaloids in Papaver Somniferum. M. Clautrian. (*Journ. de Pharm. et de Chim.*, August 15, 1889; *Pharm. Journ.*, 3rd series, 242.) According to the author the young plant is not poisonous, and not until it has attained the height of five or six inches does it contain appreciable traces of morphine, which then occurs in the whitish latex, but not at the growing point or in the rootlets. The morphine is most abundant just at the time when growth ceases and fat and albuminoids commence to accumulate in the seed. The laticifers containing the alkaloids have a marked tendency in the roots to become localized under the epidermis, but wherever there are laticifers or latex there are to be found morphine and meconic acid, and probably also narcotine, papaverine, and codeine. The presence of thebaine is thought doubtful. The alkaloids do not, however, remain exclusively in the latex: they are to be found also in the epidermal cells, in the small and thick-walled cells of the epidermis of the capsule, in less quantity in those of the epidermis of the peduncle and the leaves, plentifully in the stigmatic cells and in the hairs of the peduncle, especially at their base. They are absent, however from the epidermis cells

of the root, and do not seem to occur in the seeds. They persist longest after maturation in the epidermis cells of the capsule, but eventually they entirely disappear.

Papaver Rhœas. O. Hesse. (*Archiv der Pharm.*, 1890, 7.) The petals have again been examined by the author, who could not obtain any alkaloid from one kilo. of the dry and old drug. But the expressed juice of 300 gm. of fresh petals, when carefully concentrated, mixed with ammonia, and agitated with acetic ether, yielded a few milligrammes of crystals which were not morphine. They are insoluble in dilute soda, dissolve in dilute sulphuric acid, and the solution is coloured red on boiling, but less intensely than a solution of rhœadine. The crystals contained a little rhœadine, but appear to consist mainly of a new alkaloid, which has as yet not been further examined for want of material.

Adulterated Saffron. E. Ferraud. (*Revue Internat. des Falsificat. des Denrées aliment.*, 1889 [3], 42, 43.) The author describes a sample of saffron yielding 26 per cent. of ash mainly composed of barium sulphate, and containing 11.12 per cent. of honey and a colouring matter, probably an azo colour.

Test for the Purity of Saffron. G. Kuntze and A. Hilger. (*Journ. de Pharm. et de Chim.*, 1889.) According to the authors, pure saffron should not give more than 8 per cent. of ash on incineration, and a filtered infusion made with boiling water should give no precipitate during evaporation. A drop of concentrated sulphuric acid should give a deep blue, rapidly passing to brown.

Determination of Lupulin in Hops. F. Reinitzer. (*Bied. Centr.*, xviii. 859; *Journ. Chem. Soc.*, April, 1890.) A portion of the hops (not weighed) is sifted by Haberlandt's process, and any grains which pass through the sieve removed with forceps. The lupulin is then weighed, shaken, and washed with chloroform into a dry filter, in which it is then wrapped and extracted with chloroform for about an hour. When dry, it is removed from the filter paper to the weighing glass previously used, and weighed. The amount of lupulin husks is thus determined, and that of the lupulin found by subtracting this amount from the original weight.

A second weighed portion of the hops is then extracted with chloroform in a Soxhlet's apparatus, shaken on a sieve, the pieces of leaf removed with forceps, and the lupulin brushed through. The sifted portion is again sifted to obtain it free from grains. The pure lupulin husks are now weighed, and from the numbers, with the help of those previously obtained, the original weight of

lupulin is calculated. The method gives much more concordant results than that originally employed by Haberlandt, and gives a better insight into the composition of hops than was previously possible. Examples of analysis are given which support this statement.

Adulterated Insect Powder. M. Unger. (*Chemist and Druggist*, March 15, 1890.) Insect powder is often adulterated with the flowers of *Chrysanthemum leucanthemum*. According to the author this sophistication can be easily detected by determining the amount of ash. True insect powder yields 6.9 per cent. of ash, whereas the powder of *C. leucanthemum* flowers yields as much as 10.1 per cent. of ash containing manganese, a constituent which is not found in the other.

Insect Powder. E. Hirschsohn. (*Pharm. Zeitschr. für Russland*, 1890, 209; *Amer. Journ. Pharm.*, June, 1890.) The value of insect powder is generally supposed to be due to some volatile constituent; it is therefore frequently put up in well-closed containers, and considerable stress laid upon its having a decided odour, if effective. The author, examining a sample of the powder which for five years had been kept in a paper box, found it to be entirely odourless, but as effective as when purchased. A number of fresh samples of Persian and Dalmatian powders, which were tested and found to be effective, were heated to 120° C. for eight hours, but had not lost their activity, although they were completely deprived of odorous principles. Thinking that the value depended upon the presence of acid resin and this gradually becoming neutralized by absorption of ammonia from the atmosphere might cause deterioration, experiments were made in which the powder was mixed with alcoholic ammonia to alkaline reaction, and allowed to dry at ordinary temperature; when dried, the powder showed the original activity, neither being increased nor decreased. Of various solvents, water gave an inert extract upon evaporation; 95 per cent. alcohol, 70 per cent. alcohol, chloroform, ether, benzol, carbon disulphide and petroleum ether, all extracted the active constituent, and the residual powder was inert. With the exception of the carbon disulphide extract, which was neutral, the extracts were acid to litmus paper. If the active extractions be mixed with some inert powder, like powdered chamomile, the product acts like the original powder. Seventy per cent. alcohol will remove from the petroleum-ether extract an oily resinous mass, which, placed upon the tongue, produces a sensation similar to an extract obtained from the

pyrethrum root; these substances must be different, however, as pyrethrum possesses no vermin-destroying properties.

Spurious Cloves. T. F. Hanausck. (*Apotheker Zeitung*, 1889, 691.) The author calls attention to the occurrence in commerce of "artificial cloves," made of paste consisting mainly of wheaten flour and ground oak bark, with a small proportion of genuine cloves powder, pressed into metal moulds and roasted.

Senna Pods. A. W. Macfarlane. (*Lancet*, 1889, 164.) The author finds that an infusion of senna pods presents the advantage of being free from the nauseous odour and flavour of the leaves. It is equally certain in its action though somewhat slower than an infusion of the leaves, and does not cause griping or other unpleasant symptoms. Altogether the author expresses himself very much pleased with its action. The dose recommended for an adult is from six to twelve pods, and for the young and very aged from three to six pods, infused in a claret-glassful of cold water for six or eight hours. A liquid extract has also been used with advantage, the dose being from half a drachm to a drachm in a wine-glassful of cold water at bed time.

Senna Pods. E. F. Salmon. (*Pharm. Journ.*, 3rd series, xx, 281.) The author refers to A. W. Macfarlane's report on the therapeutic action of senna pods (preceding abstract), and adds the results of a few experiments bearing on the same subject carried out by himself. He finds that the pods are richer in cathartin than the leaves, the latter yielding 2 and the former $2\frac{1}{2}$ per cent., and that the resinous principle and volatile oil contained in the leaves are practically absent in the pods. Cold water is recommended by him as the best menstruum for the preparation of a fluid extract. The first maceration should be for twenty-four hours, while for the second twelve hours is sufficient. For 1 lb. of pods six pints of cold distilled water for the first and about three pints for the second maceration are recommended. The strained liquors are evaporated to 13 fluid ounces, then mixed with 4 ounces of spirit, and filtered after standing for several hours. The product is then made up to 16 fluid ounces with distilled water. It is described as an almost black-looking and perfectly tasteless liquid of about 1.040 specific gravity. Dose, $\frac{1}{2}$ to 2 fluid drachms.

Kola Nuts. R. H. Firth. (*Practitioner*, July, 1889.) The author's experiments confirm the reputed value of kola nuts as an efficient substitute for tea, particularly for those affected with diarrhoea. Care should be taken that neither *Garcinia kola* nor

the seeds of *Sterculia cordifolia*, which contain no caffeine, should be substituted for it. Mastication of the fresh nut is recommended as the best mode of using it.

The Fruit of *Luffa Echinata*. W. Dymock and C. J. H. Warden. (*Pharm. Journ.*, 3rd series, xx. 997.) In 1887 attention was drawn to the dangerous properties of the fruit of *Luffa echinata* by Dr. Kirtikar, in a paper presented to the Bombay Medical and Physical Society.

The fruit is ovoid, about the size of a nutmeg, studded with numerous long, rather soft diverging bristles; it is obscurely divided into three cells by numerous dry fibres, and closed at the apex by a perforated stopple, which falls off when the seeds are ripe. The seeds are about eighteen in number, ovate, compressed, black and scabrous, the testa is very hard, the kernel white and free from bitterness. The fibrous substance in which the seeds are enclosed is intensely bitter.

The authors' chemical examination of the fruit shows the presence of a principle allied to, if not identical with, *colocynthinin*. Besides this they have isolated a gelatinizing principle, which they have provisionally named "*luffein*," and which differs from pectin, vegetable mucilage, etc., by being soluble in alcohol. They have also obtained indications of a highly bitter constituent affording reactions similar to those of *colocynthinin*.

The seeds are found to contain a bland oil, free from bitterness.

Note on Adulterated Anise Fruit. W. Lawson. (*Pharm. Journ.*, 3rd series, xx. 722.) The adulteration reported upon by the author consists of a large number of small clay casts which resembled anise fruit sufficiently to escape notice by a merely superficial observer. By treatment with water, the clay was separated, and on being dried and weighed was found to amount to 70 per cent. by weight of the sample.

A Poisonous Adulterant of Star Anise. E. Barral. (*Répertoire de Pharm.*, April 10, 1890.) The falsification referred to by the author consists of the fruit of *Illicium parviflorum*, a drug to which E. M. Holmes called attention in 1880. (*Year-Book of Pharmacy*, 1881.) These fruits, which are stated to resemble those of the true star anise, are found by the author to contain a toxic principle located principally in the seed, and capable of producing vomiting, insensibility, partial paralysis, convulsions, and finally death.

Examination of the "Cream of Tartar Fruit" from Pretoria. E. J. Millard. (*Pharm. Journ.*, 3rd series, xx. 829.) The

author received from T. B. Groves two specimens of the so-called cream of tartar fruit, in order that the acid or acids it contained might be separated and identified. Some short time ago Heckel and Schlagdenhauffen had published (*Year-Book of Pharmacy*, 1889, p. 169) the results of their chemical and therapeutical researches upon the baobab, *Adansonia digitata*, the fruit of which they found to contain tartaric acid and cream of tartar. The "cream of tartar tree" is stated in text books to be *Adansonia Gregorii*, a native of North Australia, and there was no evidence that this species was indigenous to or had been introduced into South Africa. It became therefore of interest to ascertain whether the Transvaal fruit, in spite of the name under which it had been received, was not after all identical with that examined by Heckel and Schlagdenhauffen, especially as the baobab is known to be widely spread throughout Africa.

The fruits were about the size of small cocoa nuts, with smooth and exceedingly hard and moderately thick pericarps. They weighed 222.4 and 176 grams respectively. On sawing open the fruits the seeds were discovered imbedded in dry pulp, arranged in nine loculi. The pulp weighed 66.7 grains in the one and 57.3 in the other. It was of a pale brown colour, with a slight acid and sweetish mucilaginous taste and a fruity odour. Under the microscope was seen a small amount of crystalline substance, but no starch cells. The numerous seeds were reniform, the testa being hard and dark coloured. The average weight of each seed was 0.487 gram.

An analysis of the pulp showed the presence of the following proximate constituents:—

	Per cent.
Petroleum Ether Extract	0.24
Phlobaphene	1.02
Glucose	7.85
Gum and Plant Mucilage	41.20
Tartaric Acid	0.03
Acid Malate of Potassium	9.98
Metarabin and colouring matters	5.07
Cellulose and Fibre	16.23
Moisture, Salts, etc.	18.33
	<hr/>
	100.00

These results show that the fruit differs very materially in its composition from that of the baobab, for it contains no cream of tartar whatever. They approximate, however, to the qualitative

examination of a "cream of tartar fruit" by F. L. Slocum (*Amer. Journ. Pharm.*, 1880, p. 129), received from the American Consul of the Orange Free States.

An examination by E. M. Holmes of specimens upon which this report is based leads to the inference that they belong to *Adansonia Madagascariensis*; but in the absence of both flowers and leaves it was found impossible to ascertain the source with scientific accuracy.

Burdock Fruit. T. Donaldson. (*Amer. Journ. Pharm.*, March, 1890.) The author found this fruit to contain 7.25 per cent. of moisture and to yield 6.66 per cent. of ash. Petroleum-benzin extracted 8.6 per cent. of yellow fixed oil, and about 1 per cent. of whitish waxy matter, the latter being insoluble in ether. The alcohol extract amounted to 15.9 per cent., partly soluble in water; the aqueous solution, when concentrated, yielded to chloroform the bitter principle in an amorphous condition. The figures obtained differ somewhat from those reported in a paper published in *Amer. Journ. Pharm.*, 1885, 127.

Constituents of *Apium Graveolens*. W. J. Enders. (*Amer. Journ. Pharm.*, March, 1890.) The author has analysed the fruit of *Apium graveolens*, and found that petroleum ether extracted 18.67 per cent., of which 16.48 per cent. dissolved in absolute alcohol, 1.72 per cent. remained undissolved, and 0.54 per cent. volatilized at 110° C., and represented the volatile oil. The portion soluble in absolute alcohol was a dark reddish brown oily liquid of a penetrating odour and a strong taste, though not resembling the odour or taste of the drug. This, according to some investigators, consists largely of oil.

Strong ether extracted from the residual drug 1.73 per cent. of a dark brown resinous substance with a strong aromatic odour.

A crystalline glucoside was separated from the remainder of the drug by exhausting with absolute alcohol, recovering the alcohol, dissolving the residue in water, and agitating with chloroform. This substance gave the reactions of a glucoside, and gave off a strong odour when boiled with dilute acid. It was not further examined, since the amount from 50 grams of the drug was very small.

Constituents of *Areca-Nut*. A. Weller. (*Journ. Soc. Chem. Ind.*, 1890, 761.)

Arecoline.—Jahns and Marmé have studied the liquid alkaloid contained in areca-nut, and assign to it the formula $C_8H_{13}NO_2$. It has an action on the heart similar to muscarine, slackens the

respiratory action, and strongly affects the peristaltic contraction of the bowels. Applied in small amount to the eye, it powerfully contracts the pupil.

The other alkaloid, *arecaine*, contained in areca-nut, is physiologically inactive.

Some Constituents Obtained from the Fruits of Various Species of Citrus. W. A. Tilden and C. R. Beck. (Abstract of a paper read before the Chemical Society, March 6, 1890.) The authors have examined the solid matters which are deposited from freshly extracted oils of limes, lemons, and bergamot made by hand. These substances are entirely distinct from the compounds which, under the names of aurantiin, hesperidin, limonin, have been obtained by other chemists from various fruits of the orange and lemon tribe. A full description of their properties will be found in the original paper.

Solanum Carolinense. J. M. Maisch. (*Amer. Journ. Pharm.*, November, 1889.) J. L. Napier, having heard of the horse-nettle as a remedy for epilepsy, has tried a tincture of the berries, and considers it very valuable in combating convulsive disorders. The tincture was prepared from the bruised berries and diluted alcohol, using berries enough to obtain a saturated tincture, of which a teaspoonful is given every three hours until drowsiness and symptoms of vertigo are produced, when the intervals between the doses should be lengthened. A tincture prepared from the root appears to have the same effect.

According to Porcher (*Resources of the Southern Fields and Forests*), the berries have some reputation among the negroes in South Carolina as an aphrodisiac, and Valentine obtained good effects from the juice of the berries in tetanus.

The plant is found throughout the greater part of the United States, from the New England States to Mississippi and Illinois, and in some localities is quite common. Farther west it is replaced by the very prickly *S. rostratum*, and *S. heterodoxum*, of which the former has yellow and the latter purplish flowers.

Cubebs. (*Pharm. Journ.*; from Gehe & Co.'s report for September, 1889.) Most of the recent consignments of cubebs are found to consist of mixtures of genuine fruit in different stages of maturity, which may, as a rule, be separated without difficulty under the four following types:—

1. Small, unsightly, much shrivelled, grey-brown to grey-black fruit, scarcely 2 mm. in diameter, and collected in the first stage

of ripening; the stalk one and a half times to twice as long as the fruit; the seed shrivelled and often scarcely perceptible.

2. Fruit grey-black, 4 to 4.5 mm. in diameter, closely, but not very deeply and sometimes only faintly wrinkled; stalk as long as or one and a half times as long as the fruit; part of the seed well-formed and then round, adherent to the base, brown externally, greyish yellow internally, with a horny appearance towards the circumference, and part shrivelled and of a blacker hue.

3. Fruit 5 mm. and upwards; stalk 5 to 7 mm. long; colour more of a grey-brown; wrinkles deeper and less numerous; seeds mostly developed, spherical, light brown, yellowish white internally, frequently mealy and seldom horny.

4. Besides the foregoing, most parcels contain 5 to 10 per cent. of yellowish fruit, having an easily separable cork-like covering; the fruit-shell is very friable, and does not withstand the pressure of the fingers; the seed is undeveloped and adherent to the base as a more or less shapeless mass. Apparently these are genuine fruit that have been affected in their development by fungoid or weather influences. Nos. 1, 2, and 4 are coloured red immediately by concentrated sulphuric acid; No. 3 becomes at first yellow to yellow-brown, and blood-red after an hour or more. In addition, admixtures of false cubebs are not unfrequently met with; but these can usually be recognised by the seed being adherent to the inner wall of the fruit. In shape they vary, being sometimes round and then usually stalkless, or more pear-shaped and stalked. For pharmaceutical purposes preference is to be given to parcels containing a large proportion of the variety described as No. 2.

Mussænda Coffee. W. R. Dunstan. (*Pharm. Journ.*, 3rd series, xx. 381.) The author has analysed these seeds, and disproved the assertion that they contain from 0.3 to 0.5 per cent. of caffeine. With the exception of doubtful traces of choline, he found no alkaloid whatever, but ascertained the presence of a large proportion of proteid, a small quantity of sugar, and a fat resembling that of nux vomica. Lapeyrère had spoken of these seeds as a suitable substitute for coffee, and had referred them to *Mussænda borbonica*, a new species of *Rubiaceæ*. An examination of the plant at Kew showed that it is not a *Mussænda*, but *Gœrtnera vaginata*, which belongs to the natural order *Loganiaceæ*.

The Seeds of Calycanthus Glaucus. H. W. Wiley. (*Amer. Chem. Journ.*, December, 1889, 557-567.) The seeds were found to contain only a very small quantity of starch, but large amounts

of sugars, albuminoids, and oil, there being as much as 47 per cent. of the latter.

The oil has a faint yellow colour, and a peculiar odour. Compared with water at the boiling point, the specific gravity is '9058 for the oil extracted with petroleum and purified, and '9110 for the expressed oil. It is free from volatile acids. The iodine absorption for the crude expressed oil was 129.53, and for the purified extracted oil, 128.66 per cent. The fatty acids crystallized at 12.5. The refractive index of the oil determined by the Pullfrick refractometer at 28° is 1.47351; the index of pure water at the same degree, 1.33338.

The oil contains an alkaloid discovered by Eccles, and named by him "calycanthine." The author obtained this alkaloid from the extracted oil by washing the latter with dilute sulphuric acid (1:50), removing from the acid liquid traces of oil by petroleum, rendering alkaline by ammonia, and extracting the alkaloid by ether; yield, .027 per cent. of the oil. Experimenting with the kernel of the seeds freed from hulls and deprived of fat by petroleum spirit, it was ascertained that ether, alcohol, chloroform, or a mixture of ether and alcohol, would extract only a portion of the alkaloid. Better results were obtained with a mixture of ether, alcohol, and ammonia. The following process yields the largest amount of alkaloid in a pure state:—Digest for four days 10 gm. of the powder with 100 c.c. of dilute sulphuric acid (1:50) at about 35° C.; make the emulsion-like mixture strongly alkaline with ammonia, shake with ether, pour off the slowly separating ethereal layer, and evaporate; wash the resulting extract with about 100 c.c. of dilute sulphuric acid, free this solution from fat, etc., by washing with ether; render strongly alkaline by sodium hydrate, and shake with ether. Yield, 4.25 per cent. By treatment as indicated above, the hulls yielded .83 per cent. of alkaloidal principle, containing traces of calycanthine and an amorphous compound, the nature of which has not yet been determined.

Calycanthine is insoluble in alcohol and water, and separates from ether in the form of feathery crystals. With sulphuric acid it gives a pale yellow colour; with nitric acid a persistent bright green; with sulphuric acid and potassium dichromate a fine, blood-brick-red; and with sulphuric acid and cane-sugar a fine purple, persisting for some time, and finally changing to blue. Owing to the presence of sugar in the seed, this last reaction may be obtained by the simple application of sulphuric acid to the raw seed.

Polygala Butyracea. H. Heckel and F. Schlagdenhauffen. (*Pharm. Journ.*, 3rd series, xx. 165.) The African oil seeds used by the natives of the Timné (coast) and of the Korauko (interior) country near Sierra Leone have been examined by the authors, who have also described the plant yielding the seeds under the name of *Polygala butyracea*. The plant is a shrub about 6 or 7 feet high, with linear lanceolate, sessile, distant, hairy leaves. It differs from *P. rariiflora* in having larger leaves, persistent bracts, and in the shape of the posterior petals, which are straight, elongated, distorted, and recurved at the apex. From *P. multiflora*, which has also persistent bracts, it differs in the hairs not being arranged in longitudinal lines on the stem, in the longer leaves, shorter racemes, and in the pedicels shorter than the outer sepals, in the narrower petals, ciliated keel, and smooth capsule. The authors are unable to state, however, whether the two species alluded to, which are also natives of the country around Sierra Leone, have oily seeds. The seeds of *P. butyracea*, which, as well as the plant, are called in the Timné dialect "maloukang," and "ankalaki" in that of Korauko, are employed by the natives to afford an edible fat. This forms a yellowish buttery mass of an agreeable nutty flavour, which softens at 28 to 30° C., and begins to melt at 35° C., not fusing completely until a temperature of 52° is reached. After melting, it remains fluid for some time, and does not begin to solidify until the temperature falls to 33°. Its sp. gr. is 0.904 at a temperature of 35 to 38° C. This fat is contained both in the albumen and cotyledons, but aleurone grains were not detected. The fat was found to consist of 30.5 per cent. of olein, 57.54 per cent. of palmitin, 4.795 per cent. of free palmitic acid, and 6.165 per cent. of myristin. Traces of formic and acetic acid were also detected.

Constituents of the Seeds of Vicia Sativa. E. Schulze. (*Ber. der. deutsch. chem. Ges.*, xxii. 1827-1829.) The author finds that, in addition to vicine and convicine isolated by Ritthausen, these seeds also contain betaine and choline in the proportion of 11 to 12 grams of the former, and 3 to 3.5 grams of the latter, in 20 kilograms of seed.

Euphorbia Lathyris. R. Tawara. (*Chem. Zeitung*, 1889, p. 1706.) The author has made an analysis of the seeds of this plant. Besides the oil, noticed by O. Zander, he obtained two crystalline principles, one of which proved to be identical with æsculetin. The second body was not further examined on account

of scarcity of material, it being present in the seeds to the amount of 0.024 per cent. *Æsculin* does not seem to be present.

The Alkaloidal Constituent of *Nigella Damascena*. A. Schneider. (*Pharm. Centralhalle*, 1890, 174 and 191; *Amer. Journ. Pharm.*, July, 1890.) The author has isolated the fluorescent principle from the seeds of the above plant, and shows it to be an alkaloid present to the amount of 0.1 per cent., and localized in the testa. He suggests for it the name "*damascenine*." The crushed seeds were macerated with benzin and expressed, this being repeated a number of times. This solution was then treated three times with dilute hydrochloric acid (1 pt. HCl Ph. Germ., 3 pts. H₂O), filtered and made alkaline with sodium carbonate solution. In the first portion this caused a precipitate; the remaining portions as well as the filtrate from the first were extracted with chloroform. This solution was extracted with acid of the above strength, and the alkaloid precipitated with solution of sodium carbonate. The precipitate, which, however, was not solid, but consisted of small oily drops, was dissolved in absolute alcohol, and this solvent evaporated over sulphuric acid in a vacuum desiccator. The oil obtained was crystallized in a freezing mixture, and the cold solid pressed between bibulous paper. Thus prepared, the alkaloid melts at 27° C., and boils at 168° C., although it is volatile at ordinary temperature. The sp. gr. of the melted *damascenine* is 1.01. The alkaloid is insoluble in cold water, slightly soluble in hot, and easily so in ethyl and methyl alcohols, chloroform, methyliodide, carbon bisulphide, benzin, petroleum ether, benzol, fatty oils, and paraffin. All solutions of the free alkaloid show a blue fluorescence. Precipitates, consisting of minute oily drops, are formed with ammonia, sodium hydrate and carbonate, corrosive sublimate (all white), iodopotassium iodide (brownish purple, gradually crystallizing), potassio-mercuric iodide (white, crystallizing on rubbing), potassio-cadmie iodide and phosphomolybdic acid (both white, gradually turning yellow), potassio-bismuthic iodide (brown, gradually crystallizing), Nessler's reagent (greyish brown), platinum, palladium and gold chlorides (crystalline, the Au salt soon blackens by reduction), picric acid, and potassium bichromate (yellow, crystalline). A characteristic colour reaction is obtained by melting the nitrate which thus turns blue. A solution of a salt with sulphuric acid and potassium bichromate turns blood-red or violet-red. Solutions of the alkaloid containing an excess of nitric acid soon turn violet-red, which colour is soluble in alcohol,

chloroform, and acetic acid, and has almost the same colour as methyl violet. The chloride melts at 121° C., the nitrate at 98° C. (at 180° C. blue, at 210° C. brown, with a quinoline odour), the sulphate at 160 – 170° C., and the platinum double salt at 165° C. The results of a combustion agree with the formula $C_{10}H_{15}NO_3$.

Lactarius Piperatus. M. Gérard. (*Journ. Pharm. Chim.*, March 1, 1890.) This fungus has yielded to the author a cholesterol apparently identical with the ergosterin isolated by Tauret from the fat of ergot. He also found in it oleic, stearic, formic, butyric, and acetic acids, as well as a considerable quantity of lecithin.

Poisonous Constituent of Lactarius Piperatus. MM. Chodat and Chuit. (*Pharm. Journ.*, 3rd series, xx. 170.) The authors have succeeded in obtaining from this poisonous laticiferous fungus, which is not uncommon in oak and beech woods in autumn, a substance with a very acrid taste, to which they give the name of *piperone*. It is soluble in alcohol, ether, and chloroform, and melts at 100° C. The substance appears to have distinctly toxic properties.

Occurrence of Iodine in Fucus Vesiculosus and Chondrus Crispus. L. van Itallie. (*Archiv der Pharm.* [3], xxvii. 1132–1134.) The author found 0.01078 per cent. of iodine in *Fucus vesiculosus*, or 0.0113 per cent. in the absolutely dry plant. The amount of iodine in *Chondrus crispus* was too minute to estimate, though a distinct reaction was obtained with 10 grams of the drug.

Constituents of Iceland Moss. A. Hilger and O. Buchner. (*Ber. der deutsch. chem. Ges.*, xxiii. 461–464; *Journ. Chem. Soc.*, June, 1890.) The authors have reinvestigated the preparation and properties of lichenstearic and cetraic acids, which were first examined by Knop and Schnedermann (*Annalen*, lv. 164), Herberger (*Annalen*, xxi. 137), and Bolley (*Annalen*, liv. 143; lxxxvi. 50), and have obtained the following results:—

Lichenstearic acid is best prepared by extracting the powdered flakes of Iceland moss with light petroleum, evaporating the solution and boiling the residue with water, sodium carbonate being added in such quantity that a portion of the substance remains undissolved. To the filtered solution an excess of hydrochloric acid is added, the precipitate well pressed and repeatedly crystallized from light petroleum, and the solution decolorized by animal charcoal. It is then further

recrystallized several times from boiling alcohol, and is thus obtained as a voluminous white mass, consisting frequently of stellate groups of small prisms, which speedily fall into small lustrous plates. It melts at 120° , and is soluble in alcohol, chloroform, benzene, and light petroleum, but is almost insoluble in water. Its alkaline salts are the only ones soluble in water, and it is not acted on by acetic chloride. It yields a chloride with phosphoric chloride, and from the analysis of this compound, the free acid, and certain salts, it appears to be a bibasic acid of the formula $C_{43}H_{76}O_{13}$. It is converted on oxidation into carbonic anhydride and capric acid.

Cetraric acid is best obtained by Knop and Schnedermann's process, with the alteration that the precipitate formed by hydrochloric acid is extracted with light petroleum to remove lichen-stearic acid, and the colouring matter removed by a mixture of ether and turpentine oil. It decomposes at about 200° , and appears also to be a bibasic acid, the most probable formula being $C_{30}H_{30}O_{12}$.

Gum Arabic and Gum Senegal. L. Liebermann. (*Chem. Zeit.*, xiv. 665, 666; *Journ. Soc. Chem. Ind.*, 1890, 770.) Gum arabic is often adulterated with gum senegal, the latter being sometimes sold in its stead. If the gum has not been powdered, the appearance is sufficient to show which variety is chiefly present. Gum arabic forms round or irregular masses, varying in colour from colourless to brown, which reflect light strongly, almost appearing to be crystalline. Gum senegal is usually colourless or pale yellow, with a surface resembling ground glass, the pieces cylindrical or worm-like. It occurs occasionally in round masses resembling a mulberry.

On dissolving either gum in water, only small particles of wood are left, which, according to Kramsky, are usually red in the case of gum arabic, but black with gum senegal. Other gums, cherry gum for example, are only partially soluble in water, leaving a swollen residue, which only dissolves after long digestion.

With potassium hydrate, and a few drops of copper sulphate solution, both gums give a blue precipitate, which, in the case of gum arabic, is larger in quantity, coherent, and rises to the surface, while the other is more flocculent and remains diffused in the liquid. The precipitates are only slightly soluble on heating, and are not reduced even by boiling. Dextrin yields a similar precipitate, easily soluble on warming, which is completely reduced on boiling for some time. On prolonged heating with

dilute potassium hydrate, solutions of gum arabic and of dextrin become amber coloured, those of senegal are only slightly coloured.

Mixtures of gum arabic and senegal behave to the copper test like senegal alone, but with potassium hydrate they assume the amber colour. Mixtures of gum arabic or senegal and dextrin behave with the copper test like gum arabic alone; and if the amount of dextrin is not too small, reduction takes place on boiling. When only small quantities of dextrin are present, the copper precipitate after thorough warming may be filtered off, and the filtrate boiled; reduction will then take place. When all three substances are present, the precipitate should be washed, dissolved in dilute hydrochloric acid, and a large excess of alcohol added. The precipitated gum is allowed to settle for a day, washed with alcohol, dried, and examined as above.

Gum arabic may be systematically examined in the following manner:—The powdered substance is treated with luke-warm water; a gelatinous residue indicates other gums. The aqueous solution is mixed with an excess of potassium hydrate, and a few drops of copper sulphate warmed and filtered, and the filtrate examined for dextrin by boiling, the precipitate being tested as above.

It is usually stated that gum senegal is more hygroscopic than gum arabic; but when dried at 105°C ., gum senegal lost 13.39 per cent. of water, and gum arabic 14.56; and on exposure to moist air for twenty-four hours, the former gained 6.15 per cent., the latter 6.34.

The Chemistry and Commercial Possibilities of Wattle Gum. J. H. Maiden. (*Pharm. Journ.*, 3rd series, xx. 869–871, and 980–982.) Wattle gum is the produce of various Australian species of acacia, a genus which is very largely developed in that continent, comprising about 320 species, besides a large number of well-marked varieties. Although a common product, seen and known by every one in the colonies, wattle gum has not hitherto formed the subject of a systematic research. The subject acquires additional interest on account of the short supply of good gum arabic, and the statement which has been more than once made that Australia might meet the demand.

The author's treatment of the subject is an elaborate one, both from a botanical and chemical point of view, including all published references. His researches and observations, conducted with exceptional facilities for thoroughly sifting the subject, have

caused him to arrive at the conclusion that Europe and America must not look to Australia for any quantity of high-class gum.

The paper is full of interesting details; but as it is not suited for abstraction, and too long for entire reproduction, we cannot do more in this place than recommend it to the reader's attention, and refer him to the source above quoted.

Sterculia Gum: Its Similarities and Dissimilarities to Tragacanth. J. H. Maiden. (From a paper read before the Pharmaceutical Society, November 13, 1889.) The author has repeated Giraud's experiments on tragacanth (*Pharm. Journ.* [3], v. 766 viii. 773), and finds all the results obtained by that chemist confirmed. He has also repeated the experiments with substitution of *Sterculia* gum for tragacanth, and presents his results in the form of comparative statements:—

Similarities.—Qualitative.

1. Horny texture.
2. They swell enormously in water.
3. The jellies redden litmus.
4. They dissolve on prolonged boiling in a large quantity of water.
5. They dissolve on boiling in dilute hydrochloric acid.

Quantitative.

6. They contain about 20 per cent. of water.

Dissimilarities.—Qualitative.

	Sterculia.	Tragacanth.
7. In cold water.	a. Colourless. b. Granular jelly. c. Adhesiveness absent or very small.	a. Opalescent. b. Smooth viscid mass. c. Adhesive.
8. Boiling in dilute alkali.	Insoluble.	Almost entirely dissolves.
9. Caustic soda and warming.	No change of colour.	Canary - yellow colour, which fades on cooling.
10. Boiling in dilute acid.	Soluble, forming arabin [J. H. M.].	Soluble, forming pectin [Giraud].
11. Alcohol added to liquid formed in (10).	Whitish precipitate.	Formation of floating glairy mass.

Most Indian specimens of *S. urens* smell a little of acetic acid; tragacanth never does, as far as the author's experience goes.

Quantitative.

	Sterculia.	Tragacanth.
12. Specific gravity.	<i>S. urens</i> , 1.49. <i>S. diversifolia</i> , 1.472.	1.384 [Watts' "Dict." and Encyc. Britt.].
13. Soluble gum.	Arabin (chiefly). <i>S. urens</i> , 3.14 p. c. <i>S. diversifolia</i> , 9.88 p. c. <i>S. rupestris</i> , 6.9 p. c.	"A mixture of different bodies, and not a definite principle, like arabin." 8-10° per cent. [Giraud]. 7.7 p. c. [J. H. M.]. "Pectic compound." 60 p. c. [Giraud].
14. Insoluble gum.	Pararabin. <i>S. rupestris</i> , 63.42 p. c. <i>S. diversifolia</i> , 61.74 p. c. <i>S. urens</i> , 75.1 p. c.	
15. Starch.	None.	2-3 p. c. [Giraud].
16. Ash.	<i>S. rupestris</i> , 9.0 p. c. <i>S. diversifolia</i> , 8.195 p. c. <i>S. urens</i> ,* 5.83 p. c. <i>S. tragacantha</i> , 7.8 p. c. [Flückiger]. * The author finds 5.46 p. c. of ash in <i>Cochlospermum Gossypium</i> .	3 p. c. [Giraud]. 3.24 p. c. [mean of some experiments by J. H. M.]. The author believes in the general accuracy of Giraud's figures, but the difficulties of making an accurate determination are enormous. This explains the fact that no two observers obtain the same figures.

On the addition of dilute alcohol to acid solutions, the two gums show the following behaviour:—

Sterculia.—The liquid becomes cloudy throughout its whole bulk, behaving in much the same way that a weak solution of arabin would if similarly treated. It is, in fact, found to be arabin.

Tragacanth.—A glairy substance is formed, the transparency of the liquid being scarcely impaired. On standing, this jelly-like body rises to the top of the liquid. This, according to Giraud, is pectin.

The following table shows the average composition of *Sterculia* gums:—

	Rupestris.	Diversifolia.	Urens.
Soluble in cold water (chiefly arabin)	6.9	9.88	3.14
Pararabin	63.42	61.74	75.1
Moisture	20.52	20.2	16.6
Ash	9.015	8.195	5.83
	99.855	100.015	100.67

Pararabin, like metarabin, is a modification of arabin. While metarabin is converted into arabin by treatment with dilute *alkali*, pararabin is similarly converted by treatment with dilute *acid*. They both are insoluble, but swell up in cold water. A solution of pararabin in weak acid is precipitated by alkalies.

Persian Gum. E. Sickenberger. (*Pharm. Journ.*, 3rd series, xx. 793.) Owing to the pale colour of this gum, and its general resemblance to Khordofan gum, it is stated to have been much sold for the latter. The gum, however, is described by the author as not soluble in water, but only swelling up in it, and as being less brittle than Khordofan gum. He suggests that this Persian gum may be the produce of *Prunus Bokharensis* and *Prunus Pudum*. The specimens of Persian gum that have appeared in the London market resemble East Indian or Senegal gum of good colour, rather than the white, minutely cracked, opaque Khordofan gum.

The Composition of Tragacanth. J. Ogle. (*Pharm. Journ.*, 3rd series, xx. 3.) Owing to the conflicting statements made in various works on materia medica respecting the composition of tragacanth, the author has re-investigated this subject. His results are tabulated as follows:—

Moisture	.	.	.	.	.	.	.	18·92
Soluble Gum	.	.	.	.	.	.	.	35·94
Ash	.	.	.	.	.	.	.	2·75
Insoluble Gum (by difference)	.	.	.	.	.	.	.	42·39
								<hr/> 100·00

No evidence of the presence of starch could be obtained, the iodine test producing no coloration, nor could the official statement that “after maceration in cold water the fluid portion is not precipitated by the addition of rectified spirit” be verified.

Gum Ghatti. C. F. Henry. (*Pharm. Journ.*, 3rd series, xx. 781.) Only 75 per cent. of this gum were found to dissolve in water, the remaining 25 per cent. being insoluble also in hot water even after prolonged boiling. It however swells up considerably. A 1 to 3 mucilage was found to be of greater density than B. P. Mucilago acaciæ, and free from unpleasant taste. The gum when incinerated left 1·7 per cent. of ash, which was of a whiter hue than that of the gum acacia, and contained both calcium and potassium salts. The ash of gum ghatti and acacia also differed in the amount of carbonate, that of ghatti containing much the larger proportion.

Constituents of Myrrh. O. Köhler. (*Archiv der Pharm.*, 1890, 291-313.) The portion soluble in water, but insoluble in alcohol, was found to be a gum of the carbo-hydrate formula, $C_6 H_{10} O_5$. The portion soluble in alcohol is a mixture of several resins, the greater part of which is an *indifferent* soft resin, soluble in alcohol and ether, of the formula $C_{26} H_{34} O_5$, containing three replaceable hydroxyl groups; there are also soluble in alcohol two dibasic acids of the formulas, $C_{13} H_{16} O_8$ and $C_{26} H_{32} O_9$. The volatile oil is present in larger quantity (7-8 per cent.) than has previously been found (2.18 per cent.); by far the greater part consists of a body of the formula $C_{10} H_{14} O$, isomeric with thymol and carvol, but apparently a different substance. The formulas for the part soluble in alcohol show a certain relationship. If the formula $C_{13} H_{16} O_8$ be doubled, there will result the three formulas, $C_{26} H_{34} O_5$, $C_{26} H_{32} O_9$, and $C_{26} H_{32} O_{16}$, showing that the differences in the resins are due to different stages of oxidation. The essential oil, upon exposure, will assume the consistence and other appearances of myrrh.

Balsamodendron Berryi. D. Hooper. (*Pharm. Journ.*, 3rd series, xx. 143.) Buchanan's "Journey through Mysore, Canara, and Malabar," mentions a species of myrrh about which little is known. "Many of the hedges here and in other parts of Coimbatore are made of a thorn called *Mulukilivary*." The *Mulukilivary* mentioned in this extract proves to be the *Balsamodendron Berryi*; and Coimbatore, the habitat of the plant, is a district lying to the south of the Nilgiri Hills. This shrub yields a gum resin similar to the officinal myrrh. A sample of this was received by the author, who furnishes the following description of it:—

The gum resin was in pale yellow, yellowish brown, or brown translucent fragments, tough, and breaking with a shining conchoidal fracture. The surface had an oily appearance, and when scratched or rubbed with some hard implement showed milk-white markings. Pieces of reddish brown bark were attached to some fragments, and others were adhering to cloth in which it had been collected. The powder was of a dirty white colour, and when rubbed up with water made a thin emulsion. The odour was oily, not fragrant. The taste was simply mucilaginous. It dissolves for the most part in water, leaving a few flocks of soft resin and impurities undissolved.

A selected sample of the gum resin gave to water 84 per cent. of gum; it contained 5 per cent. of moisture, and 6.6 per cent. of mineral matter. The gum was gelatinized by ferric chloride, and

like that from true myrrh was not precipitated by neutral plumbic acetate. The resin was soft, transparent, tasteless, odourless, and neutral in reaction. It was soluble in alcohol, ether, bisulphide of carbon, and chloroform. The solution in alcohol was not coloured by ferric chloride, and gave a right-handed rotation when examined with polarized light. The resin moistened with alcohol gave no colour with concentrated nitric or hydrochloric acid, and no violet liquid was obtained when bromine was added to its solution in carbon bisulphide. The resin separated by alcohol and evaporated was exposed to the heat of a water-bath for a week, and remained soft and tenacious; after this it was exposed to the air for about two months, but its consistence was not altered, and when examined under the microscope was seen to be perfectly amorphous.

The myrrh from the *Mulukilivary* is distinct from the true myrrh, Arabian myrrh, and *Bissa Bol*. Its freedom from bitterness and fragrance would render it unfit as a substitute for the genuine drug, and useless as a medicinal agent. It gives off no odour when burnt, and is therefore unsuitable as an ingredient in incense. It forms a good adhesive mucilage, and might be used as a convenient addition to some kinds of confectionery. An allied species of myrrh, yielding a similar exudation, is the *Balsamodendron pubescens*, growing in Beluchistan, and remarkable for the large proportion of gum in the gum resin.

Australian and Tasmanian Sandarach. J. H. Maiden. (*Proc. Roy. Soc. Tasmania*, August, 1889. From *Journ. Soc. Chem. Ind.*) The following is a list of resins of different species of Australian pines:—

Resins of *Callitris cupressiformis* ("Oyster Bay pine" of Tasmania), *Callitris calcurato* ("Murray-," "Black-," "Red-," "Scrub-," "Cypress pine"), *Callitris columellaris* ("Cypress pine"), *Callitris verrucosa* ("Mountain Cypress pine"). All these resins have an excellent appearance as regards colour and brilliancy. They are almost completely soluble in rectified spirit, while light petroleum spirit dissolves a very considerable quantity. They possess a pleasant aromatic odour, similar to that emitted by ordinary sandarach. When the trees are wounded, these resins exude in an almost colourless, transparent condition, and have a high refractive power. They soften slightly in boiling water, and feel gritty to the teeth.

The Resin of Myoporum Platycarpum. J. H. Maiden. (*Amer. Journ. Pharm.*, December, 1889.) This resin is yielded by a small

tree which is found in the interior of Australia; it occurs in the more arid portions of all the colonies except Queensland. The tree is *Myoporum platycarpum*, and possesses a variety of local names, such as "sandal-wood," "dog-wood," and "sugar-tree"; a manna exudes from it which is greedily sought after by the blacks, and is likewise much appreciated by colonists. It yields a resin, which is used by the aborigines as a substitute for pitch and wax; it forms a natural sealing-wax, and is sometimes used by people in the interior for this purpose. It would probably serve as a constituent of black sealing-wax; by itself it is too soft for keeping in this climate.

It sometimes occurs in great quantities on the stem, is hard and brittle, breaks with a glassy fracture which is at first of a purple or indigo colour, but becomes brown on keeping. Often it may be picked up from under the trees in rounded or globular pieces.

Two samples were examined by the author with the following results:—The first, from Lachlan River, New South Wales, was in small rounded lumps, usually weathered on the outside, and having a pleasant empyreumatic odour; these were of a dark reddish brown colour, flew with the slightest touch of the pestle, and were easily powdered. The resin had a bright fracture, which appeared almost black, but showed reddish brown at the edges. It softened even with the warmth of the hand, and if kept in a bottle, the heat of an average summer day was sufficient to fuse pieces presenting fresh fractures. It presented some external resemblance to guaiacum resin, but it was not so green in colour as the latter. It had no taste. Cold water had no effect on it, but if the water was heated the resin melted and floated, forming a liquid much resembling tar, but of a purplish brown colour. The water remained clear, colourless, and almost odourless. Light petroleum dissolved 46·8 per cent. of a reddish brown resin, destitute of odour. Alcohol dissolved from the residue 28·1 per cent. of a deep reddish brown resin, which was almost black by reflected light. The residue was boiled in water and 1·7 per cent. of saline matter was extracted, while 23·4 per cent. of accidental impurity was left behind. This had a chocolate odour, and under a lens was seen to consist of a little ligneous matter, with a large percentage of inorganic impurity. It was quite free from gum. The crude resin melted at 90·5°. It contained no tannic acid.

The second sample was procured from Netallie, Wilcannia, New South Wales. It presented no marked points of difference, as regards physical appearance, from the preceding one. On treating

it with alcohol, the liquid was not so dark as that yielded by the preceding sample, neither was the colour so rich. It resembled tawny port, but was a little darker. Light petroleum extracted 48·6 per cent. of resin, and alcohol added to the residue extracted 36·4 per cent.

Oleo-Resin of Araucarias. E. Heckel and F. Schlagdenhauffen. (*Comptes Rendus*, cix. 382-385; *Journ. Chem. Soc.*, December, 1889.) Araucarias differ from other coniferæ in that they secrete an oleo-gum-resin containing a large proportion of arabin. The secreting glands are at first normal and secrete oleo-resin, but at a certain time the cells bordering upon the glands elongate into papillæ, which converge to the centre of the glands, and completely obstruct the passage. From this time the neighbouring cells cease to secrete oleo-resin, become gelatinous, and are converted into liquid gum or arabin, which mixes with the oleo-resin previously secreted. At a particular time the glands are filled with a limpid liquid, which becomes white and opaque when exposed to air, and in which gum or oleo-resin predominates, according to the species and time of year. *Araucaria Brasiliensis*, *A. Bidwilli*, *A. Cunninghami*, *A. excelsa*, *A. Cooki* were examined.

The proportion of gum in the secretion from one and the same species varies from 86 to 59 per cent., and in different species from 29 to 93 per cent. The secretion consists chiefly of gum, which usually contains a small quantity of glucose. In the case of *A. Bidwilli*, the portion of the secretion which is soluble in alcohol consists of a crystalline substance which dissolves in water and seems to be identical with *pinite*, the sugar found by Berthelot in *Pinus lambertiana*. All the oleo-resins and their essences are dextrogyrate in chloroform solution. The solutions in alcohol and in light petroleum contain no inorganic substances, but the portion soluble in water leaves an ash consisting mainly of calcium chloride, with some alkaline sulphates, calcium sulphate and carbonate, and small quantities of iron and manganese.

Botany Bay or Eucalyptus Kino. J. H. Maiden. (*Pharm. Journ.*, 3rd series, xx. 221, 222, and 321-323.) The author states that in Australia kinos are largely used in rural medicine, on account of their astringent properties, aqueous solutions being almost invariably made. Some of them are also used for ink, or for staining leather. The commerce with Europe and America in eucalyptus kino has never been considerable.

Classification of Eucalyptus Kinos.—Eucalyptus kinos can be very simply classified, according to their behaviour with alcohol or

water. In all cases the author made the tinctures of the strength of Tinct. kino, B.P. The kinos experimented upon by the author fall into three groups, which he has called the Ruby Group, the Gummy Group, and the Turbid Group respectively.

(a) *Ruby Group.*

<i>E. amygdalina,</i>	<i>E. piperita,</i>
<i>E. Eugenioides,</i>	<i>E. Sieberiana</i> (syn. <i>E. virgata</i>),
<i>E. hæmastoma,</i>	<i>E. stellulata,</i>
<i>E. macrorrhyncha,</i>	<i>E. melliodora,</i>
<i>E. pilularis,</i>	<i>E. obliqua.</i>

In the preparation of a tincture, all the above kinos tend to dissolve entirely, forming clear ruby solutions of approximately the same tint. They also form clear ruby solutions to cold water, hardly differing in appearance from the tinctures. The aqueous solution of the alcoholic extract is similar in appearance. Members of this group are not very friable, breaking down into clean angular fragments, and never forming an impalpable powder. If acetate of lead or of copper be added to a moderately strong solution of these kinos, so strongly gelatinous a precipitate will be formed that the test-tube may be inverted without any liquid spilling. This distinguishes them, in one respect, from the "Turbid Group."

(b) *Gummy Group.*

<i>E. leucoxydon,</i>	<i>E. robusta,</i>
<i>E. paniculata,</i>	<i>E. saligna,</i>
<i>E. resinifera,</i>	<i>E. siderophloia.</i>

In spirit, these kinos scarcely dissolve, leaving abundant granular residue of gum. Supernatant liquid perfectly clear. These kinos tend to be perfectly soluble in cold water, and age seems to have but little effect on them in this respect. They are like the ruby kinos in not forming impalpable powders, being even tougher than the members of that group. They form gelatinous precipitates with some metallic acetates, like the ruby group.

(c) *Turbid Group.*

<i>E. goniocalyx,</i>	<i>E. Stuartiana,</i>
<i>E. hemiphloia,</i>	<i>E. viminalis,</i>
<i>E. rostrata,</i>	<i>E. terminalis,</i>
<i>E. punctata,</i>	<i>Angophora lanceolata,</i>
<i>E. odorata,</i>	<i>A. intermedia.</i>
<i>E. Gunnii,</i>	

The above yield orange-brown solutions.

E. corymbosa yields solutions up to the brightest ruby. This kino is usually so brilliant in colour, and yields such rich-coloured tinctures, that it cannot well be mistaken for any other kind.

E. microcorys and *E. maculata* yield solutions of various shades, from lemon-yellow to orange-brown. These two are often externally much alike, but they may be distinguished (1) by the facility with which the former dissolves in water, (2) by the yellow colour which the latter yields to ether.

E. Maculata, *E. punctata*, and *A. lanceolata* possess odours. The essential oils which cause them may be removed by ether.

All the members of this group yield turbid solutions with spirit, which require long standing or filtering to become clear. They behave in a similar manner to water, but become clear on boiling, indicating catechin. The aqueous solutions of the alcoholic extract are likewise turbid. They are all more or less friable, forming impalpable powders usually by pressure of the fingers. Addition of acetate of lead or copper produces only a very slight gelatinous precipitate, thus dividing them from the other two groups.

The author proceeds to show that the long-standing claim of certain species known as *Eucalyptus resinifera* to be yielders of "Botany Bay Kino" is unfounded, and that the products of the two plants known under this name are quite useless for the preparation of a tincture on account of their comparative insolubility in alcohol.

The following list is given of species which satisfy the requirements of the British Pharmacopœia, and the hope is expressed that systematic endeavours will be made to place kinos of this description on the market.

1. All members of the Ruby Group.

2. The following members of the Turbid Group:—

E. goniocalyx, *E. hemiphloia*, *E. rostrata*, *E. punctata*, *E. odorata*, *E. Gunnii*, *E. Stuartiana*, *E. viminulis*, *E. terminalis*, *E. corymbosa*.

The remaining members of the Turbid Group are here omitted on account of their colour.

All members of the Gummy Group should be rejected.

Dealing with the gelatinization of tincture of kino, the author states that whatever the cause of this change may be, no chemist need be troubled with it if he chooses to avoid it. Old ruby kinos should be rejected for the purpose of tincture making. In the case of a member of the Ruby Group, if the kino is not completely and readily soluble in cold water, forming a clear ruby solution,

with no gelatinous ruby-coloured residue of phlobaphene, it should be rejected.

Liquid Kino. J. H. Maiden. (*Proc. Roy. Soc. Victoria*, 1890, 82, 83. From *Journ. Soc. Chem. Ind.*) *Angophora intermedia* (D.C.), the narrow-leaved apple-tree, is a tallish tree, which extends from Victoria to Queensland, and is the only species of the genus which is found in the southern colony. In the following respect it is perhaps unique amongst Australian trees. Frequently when an incision is made into the bark, and more particularly when the knobby excrescences sometimes found on the tree are cut, there exudes a watery liquid which occasionally is almost as clear and as colourless as water, and at other times of an orange-brown or reddish-brown colour, and of the consistency of a thin extract, or even as thick as treacle. This appears to be the substance which was sent from New South Wales to the Paris Exhibition of 1867, labelled "apple-tree juice," with the statement that it is used as a varnish; but this is not correct, as the liquid is aqueous. It is used by fishermen for tanning their nets. A single tree will yield two gallons or more of "liquid kino."

Two samples of this "liquid kino" having recently been forwarded to the Technological Museum, the author has had an opportunity of examining it.

1. From Bangley Creek, Cambewarra, N.S.W., of a clear reddish brown colour, somewhat like raw linseed oil, Strasburg turpentine, or dark balsam of copaiba, but redder than any of them. It has a specific gravity of 1.008 at 60° F., and a sour smell (owing to the presence of acetic acid), accompanied by an odour reminding somewhat of spent tan liquors. It deposits a quantity of sediment of a buff colour, consisting almost entirely of catechol. It contains tannic acid .772 per cent., "non-tannin" .508 per cent. (Löwenthal's process). The water amounts to no less than 98.3 per cent. The catechol was not estimated in this sample.

2. This was obtained from Cambewarra, but from a different locality. It is darker than the preceding sample, being of a rich ruby colour. Like No. 1, it deposits a small quantity of sediment (catechol). This liquid kino had a specific gravity of 1.022 at 60° F., when received in April, 1888.

The following results were obtained in December to January, 1889:—Tannic acid, 3.048 per cent. (of the liquid kino, without evaporating), "non-tannin" 1.27 per cent. (a portion of liquid kino, kept in agitation so as to obtain a fair proportion of sedi-

ment, was added to the water to make up the strength of one grain of liquid kino to the litre), water 96·7 per cent. (after filtration from deposited catechol). The catechol and a little phlobaphene filtered off were found to be in the proportion of 495 per cent. of the original liquid kino. Ether agitated with the filtrate took up 15 per cent., of which one-third was estimated to be catechol and the rest resin.

Musambra, a Variety of East Indian Aloes. D. Hooper. (*Pharm. Journ.*, 3rd series, xx. 121.) A specimen of aloes known as *Musambra*, and bought by the author in Bangalore, presents the following characters. It occurs in thick cylindrical pieces of $\frac{1}{2}$ lb. to 1 lb. or more. The colour is black, and liver-coloured in places where it is broken or rubbed. It breaks or crumbles up into small *angular* fragments, not into laminae or splinters, as in other kind of aloes. It is distinctly porous, and small stones and other impurities are seen to be imbedded in its substances. The odour is agreeably aromatic. The powder is dull umber brown. When moistened and examined under the microscope, the crystals of aloin only slowly made their appearance, which would imply that there was a smaller quantity than usual of the active principle.

A proximate analysis of the drug gave the following result :—

Water Extract	53·8
Resin soluble in Acetic Acid	10·4
Resin insoluble in Acetic Acid	8·5
Insoluble in Proof Spirit	1·9
Mineral Impurities	21·8
Moisture	3·6

100·0

The drug responded to the general tests for aloes. Borntrager's test = a rose colour, Cripp's and Dymond's test = deep orange-red. Ditto with ammonia = claret. Nitric acid in the cold = deep red. Nitric acid vapour passed over some of the powder mixed with sulphuric acid gave no blue colour. The last two tests are characteristic of Barbadoes aloes.

Aloin from Barbadoes, Curaçao, and Natal Aloes. E. Grønewold. (*Archiv der Pharm.* [3], xxviii. 115–139; *Journ. Chem. Soc.*, June, 1890.)

I. Aloin from Barbadoes Aloes.—This was obtained as small pale-yellow, needle-shaped crystals, slightly soluble in cold water

easily soluble in hot water. In boiling water it rapidly becomes brown. It is more soluble in alcohol than in water, and the solution is more stable. Aloin is only slightly soluble in ether, chloroform, light petroleum, and benzene. Acetic acid dissolves it readily, and this solution is unaffected by the air. The moist crystals very readily become discoloured, especially when exposed to light. The substance melts at 147° . The results of numerous analyses are best expressed by the formula $C_{23}H_{24}O_{10}$, but the author prefers to adopt $C_{16}H_{16}O_7$, which best accords with the bromine- and acetyl-derivatives. If the latter be accepted, then the air-dried crystals obtained from a concentrated alcoholic solution would be expressed by $C_{16}H_{16}O_7 + 3H_2O$ or $3\frac{1}{2}H_2O$. A bromaloin, $C_{16}H_{13}Br_3O_7 + 4H_2O$, was obtained by pouring an aqueous solution of aloin into bromine-water, or by pouring bromine-water into the aloin solution. The two bromo-compounds agreed, excepting a difference of about 1 per cent. in the water of crystallization. This variation has also been noticed by E. Schmidt.

Acetyl-derivatives were only obtained with difficulty by the action of acetic anhydride on adding either concentrated sulphuric acid drop by drop, or on adding a drop or two of acetic chloride. In the former case, the product occurred sometimes as white, hard, columnar crystals, $C_{16}H_{10}Ac_6O_7$, and sometimes as beautiful, soft, yellow needles, $C_{16}H_{13}Ac_3O_7 + \frac{1}{2}H_2O$. In the latter case, only the yellow needles were obtained.

II. *Aloin from Curaçao Aloes*.—This appears to be identical with that from Barbadoes aloes.

III. *Aloin from Natal Aloes*, $C_{24}H_{26}O_{10} + Aq$ (various).—This differs both chemically and physically from the two aloins just considered. It can readily be obtained in the form of large, well-formed crystals; this, together with its resistance to the action of alkalies, distinguishes it from Barbadoes aloin. Halogen substitution-products are not readily obtained. Oxidation with nitric acid yields both oxalic and picric acids. Heated in a capillary tube, the aloin softens at 180° and melts with decomposition at 210° . The acetyl-derivative appears to be $C_{24}H_{21}Ac_5O_{10}$. Natal aloin differs from Barbadoes aloin in containing a methoxyl-group, as determined both in aloin, $C_{23}H_{23}(OMe)O_9$, and in acetylaloin, $C_{23}H_{18}(OMe)Ac_5O_9$.

Aloes. J. Bainbridge and C. Morrow. (*Pharm. Journ.*, 3rd series, xx. 570.) The authors have studied the action of

various reagents on different kinds of aloes, and summarized their results in the following table:—

Commercial Specimens.	HNO ₃ .	H ₂ SO ₄ and vapour of HNO ₃ .	Cripps and Dymond.	C. and D. with NH ₄ HO.	Bromine Test.	Fe ₂ Cl ₆ .
Aloes hepatic .	reddish brown	nil	orange-red	intense brownish red	nil	All varieties of aloes give an olive-green coloration with the above reagent.
True socotrine .	reddish brown	"	orange-red	intense brownish red	"	
Commercial socotrine . .	faint crimson	"	crimson	deep claret	"	
Cape	permanent green after standing a few minutes	"	orange-red	pale claret	"	
Curaçao	evanescent crimson	"	crimson	intense claret	"	
Natal	permanent crimson	deep blue	deep crimson	intense brownish red	"	
Barbadoes . .	crimson soon fading	slight bluish green occasionally	crimson	deep claret	"	
Kew Specimens.						
<i>Aloe ferox</i> . .	evanescent crimson	green	pale yellow	red	violet	
— <i>Succotrina</i> . .	permanent crimson	deep blue	crimson	intense brownish red	deep purplish red	
— <i>vera</i>	nil	slight green	—	—	nil	
— <i>Perryi</i> . . .	"	nil	—	—	"	
— <i>purpurascens</i> .	crimson fading to light red	"	—	—	violet	
— <i>platylepis</i> . .	nil	"	—	—	nil	
— <i>arborescens</i> var. <i>frutescens</i>	"	"	—	—	"	
— <i>Africana</i> . .	evanescent red changing after a few minutes to green	"	orange-red	pale claret	"	
— <i>Chinensis</i> . .	nil	"	—	—	"	

The following conclusions are drawn from the authors' experiments:—

1. That Cape aloes may be produced from *A. Africana*, but chemical tests afford no evidence that it is obtained from the other species which have been stated to yield it.

2. That Natal aloes may be obtained from *A. succotrina*, but

that chemical tests do not indicate that the other species whose inspissated juice the authors examined are likely to produce it.

3. That the aloes at present sold in commerce as Socotrine aloes is not obtained from *Aloe Perryi*, but probably from some variety of *Aloe vulgaris*, or species allied to it; and—

4. That the hepatic aloes of commerce is probably obtained from *Aloe Perryi*.

Eucalyptus Honey. L. Maquenne. (*Ann. Chim. Phys.* [6], xvii. 495–500; *Journ. Chem. Soc.*, February, 1890.) Eucalyptus honey is secreted by a peculiar species of black bee, which constructs enormous hives on the summits of the gigantic *Eucalypti* of Australia. Some of these hives furnish as much as 5,000 kilos. of crude honey each. It is a thick syrup, similar in appearance to ordinary honey, but containing a somewhat smaller proportion of crystals, and it has a strong aromatic odour. It consists essentially of levulose and dextrose in practically the same proportions as in invert sugar, with a small quantity of aromatic substances, and traces of gum insoluble in alcohol. No peculiar sugar could be detected.

Cod-Liver Oil. M. Unger. (*Amer. Journ. Pharm.*, November, 1889.) The author publishes the following conclusions, drawn from recent experiments:—1. In cod-liver oil the phosphorus and the iron contained in it are combined with albumen. 2. In the good qualities, the albuminoid bodies have undergone no alteration, whilst in the yellow and the brown qualities they gradually decompose. 3. These albuminoids become separated from the oil when carbonic acid is introduced into a mixture of the oil with water. 4. Pharmacists should require that the amount of free fatty acid contained in the oil shall not exceed 4 to 5 per cent., and that the oil in contact with nitric acid of 1.40 shall form an albuminous ring in five hours.

Croton Oil. A. Reuter. (*Apotheker Zeitung*, 1890, 320. From *Pharm. Journ.*) The varying statements that have been made with regard to the solubility and activity of croton oil have induced the author to experiment with a series of oils prepared in different ways. (1) Croton oil extracted direct from the seeds by means of alcohol, which was a very thick brownish yellow liquid, soluble in light petroleum spirit and very freely in ether and in alcohol; it had a very acrid taste, and consisted principally of free crotonoleic acid. (2) Oil removed by light petroleum spirit from seeds already extracted by alcohol, which was less acrid, contained only a trace of free crotonoleic acid, and consisted principally of

the neutral glyceride. It dissolved with difficulty in absolute alcohol, but freely in ether and in light petroleum spirit. 5 c.c. shaken with 45 c.c. of alcohol and allowed to stand showed an oily layer measuring 2.5 c.c., so that the remaining 2.5 c.c. had dissolved in the alcohol in the proportion of 1 in 18. Upon adding 6 drops of oil No. 1 (free crotonoleic acid), the oil layer decreased to 1.8 c.c., and with 12 drops to 1.3 c.c., showing that the solubility of croton glyceride in alcohol increases with the proportion of free crotonoleic acid accompanying it. This oil, added drop by drop to 25 c.c. of alcohol, and shaken after each addition, did not cause permanent turbidity until 24 drops had been added. (3) Oil extracted direct by means of light petroleum spirit from seeds not previously treated with alcohol had an acrid taste, and contained, besides the neutral glyceride, some free acid, so that it might be described as an acid oil. Of this oil 31 drops could be added to 25 c.c. of alcohol before permanent turbidity was produced. (4) Oil extracted direct from the seeds by means of ether contained both neutral glyceride and free acid, the latter being present in rather larger proportion than in oil No. 3, as it is more soluble in ether than in petroleum spirit. This was shown by the addition of 37 drops to 25 c.c. of alcohol before a faint turbidity became apparent. (5) Croton oil of commerce; deep yellow; probably pressed from seeds. Added drop by drop to 25 c.c. of alcohol, turbidity was produced by 32 drops. In this and the previous cases the turbidity disappeared upon the addition of a drop or two of oil No. 1. The author points out that as the methods of preparing croton oil differ, the proportions of the free acid and neutral glyceride in commercial oil may vary widely. Some manufacturers are said to have given up pressure as a means of obtaining the oil, in favour of extraction with light petroleum spirit, which as shown by oil No. 3 would give an acid oil; whilst the proportion of free acid liable to be extracted would increase with the age of the seeds, through the breaking up of the glyceride. The author points out that Hirschheydt has proved that a neutral oil, though free from some disadvantages attending the administration of an acid oil, is sufficiently active, since the neutral glyceride is split up in the human organism by the pancreatic ferment.

Croton Oil. R. Kobert. (*Pharm. Journ.*, 3rd series, xx. 978.) About three years ago Hirschheydt combated H. Senier's statement that under certain conditions croton oil was separated by alcohol into two constituents, one being the vesicating and the

other the purgative principle. This view was opposed on the ground that two kinds of active principles could not be so separated, since the purgative and the vesicating action alike are due to crotonoleic acid, which may occur in the oil both in the free state and as a glyceride. This view is upheld by the author of the present paper. In his opinion no definite relation of solubility between croton oil and alcohol can be established, since it varies with the age of the oil. The varying solubility of the oil is attributed by him to the fact that the crotonoleic glyceride no longer exists in old samples of the oil, but only the free acid. From a large number of pharmacological experiments it was concluded that a neutral croton oil is essentially milder in its action than an acid oil, such as is official in the German Pharmacopœia. The author therefore recommends, if croton oil be retained in the Pharmacopœia, that only the neutral crotonglyceride should be used, which can be kept unaltered if protected from light.

Croton Oil. W. C. Zinnel. (*Amer. Journ. Pharm.*, March, 1890.) The author determined the amount of oil present in commercial croton seeds. The seeds were beaten to a paste, exhausted by successive portions of the solvent, and the latter then evaporated or distilled. Using for each experiment 100 gm. of seed, the amount of oil obtained was as follows: with benzin, 33.321 gm., with chloroform, 22.9 gm., and with carbon disulphide, 33.7 gm. The two last oils were darker in colour and more viscous than the first; that obtained by benzin was pale straw-yellow, and had the sp. gr. .934. The cause of the small yield with chloroform was not ascertained. The seeds (100 gm.), deprived of the testa, which constituted 29.67 per cent. of the entire weight, gave with benzin 21.8 gm. of oil; no cause is assigned for the deficiency as compared with previous experiments. The testa yielded 1.65 per cent. of oil.

Oleum Peponis (Oil of Pumpkin Seed.) L. A. Minner. (*Amer. Journ. Pharm.*, June, 1890.) Two commercial samples of oil of pumpkin seed experimented with by the author proved to be ineffective as remedies for tape worm, while the oleo-resin prepared by himself proved very active. The oleo-resin is prepared by triturating the coarsely powdered seeds with pumice stone in a mortar, exhausting with ether by maceration and percolation, and evaporating the solvent at a gentle heat. After washing the oil with some alcohol, it forms a thick liquid of a red colour, having a peculiar unpleasant odour, and a disagreeable rank taste. Its specific gravity at 60° F. is about 0.924. It is almost insoluble in

alcohol, soluble in chloroform, petroleum ether, and benzol, and does not congeal at 32° F. Strong sulphuric acid changes the colour to green, then dark green, and after several hours to a dull red-brown, a blackish deposit being also formed. Strong nitric acid changes it to red-brown, and after about five minutes causes violent effervescence, a disagreeable odour being given off, and after cooling a reddish brown semi-solid mass is left.

The oleo-resin may be given in doses of $\frac{1}{2}$ to $1\frac{1}{2}$ fluid ounce, in the form of an emulsion flavoured with aromatics.

The Fatty Oil of *Cyperus Esculentus*. C. Hell and S. Twerdomedoff. (*Ber. der deutsch. chem. Ges.*, xxii. 1742-1745.) The tubers of *Cyperus esculentus*, the so-called earth-almond, contain, besides sugar, a considerable quantity (27.1 per cent.) of a fatty oil which can be isolated by extracting with light petroleum. The authors' experiments show that the fatty oil of *Cyperus esculentus* consists principally of the glyceride of oleic acid, but also contains small quantities of the glyceride of myristic acid.

Oil of Maize. C. E. Bowers. (*Amer. Journ. Pharm.*, October, 1889, 503.) The youngest specimen of seed experimented with by the author was found to contain 1 per cent. of its weight of oil. It was observed that the amount gradually increased with the age of the corn, until the maximum was reached in that which was allowed to fully ripen and dry upon the stalks. The amount yielded by such corn was 3.16 per cent.

The oil is said to reside entirely in the embryo or germ of the corn; and to ascertain if such be the case, a portion of the corn was carefully deprived of its embryo, coarsely powdered, and percolated with petroleum ether. No oil was obtained. The germs, on the other hand, freed from all integuments and treated in the same manner, yielded 22 per cent.

The oil is of a pale yellow colour, and has a somewhat thicker consistence than either cotton-seed or olive oils. The odour of the oil is slight but peculiar, its taste not unpleasant, bland and oleaginous; its specific gravity is .917. It is a fixed oil, belonging to the group of non-drying, and is well adapted for lubricating purposes. It is soluble in all proportions in ether, bisulphide of carbon, chloroform, and benzin; very sparingly soluble in 95 per cent. alcohol, forming a milky mixture when shaken with that solvent, which separates on standing into two layers, both of which are perfectly transparent. The oil readily saponifies with so weak an alkali as lime water, and with potash or soda it forms a white soap. A thin layer of the oil exposed to the air for

several weeks did not show any rancidity, and to all appearances remained unchanged. In this respect it compared favourably with the oils of rape-seed, olive, etc.

Upon strongly heating, the oil emits characteristic smoky, irritating, and very disagreeable vapours, somewhat similar to those produced in the heating of cotton-seed oil. It therefore would not be tolerated as an adulterant to lard, because the odour developed upon heating would certainly betray its presence. Lard itself is decomposed at high temperatures, but the odour produced is entirely distinct from that produced when oil of maize is associated with it.

It cannot be used to adulterate olive oil, as it gives different results with all the tests for the identity of that body. With concentrated sulphuric acid it instantly darkens. Immersed in a freezing mixture of ice and salt, it does not deposit a granular substance, and remains nearly transparent, but becomes very notably thicker in consistence. The probability is that it consists largely of olein.

It is more easily absorbed by the skin than cotton-seed or olive oils, and appears to be an excellent vehicle for external applications. It also dissolves camphor with more facility than those oils.

Numerous preparations of the Pharmacopœia were made by substituting oil of maize where cotton-seed oil is directed, to ascertain whether it is capable of replacing that body. The results were very satisfactory in every case. In some instances its superiority over cotton-seed oil was very well marked. In the preparation of ammonia liniment this feature was most prominent. The oil readily saponified on the addition of the ammonia water, forming a smooth creamy mixture, which did not become curd-like or separate on standing, as is frequently the case with the officinal liniment of ammonia. Examined at the expiration of two months, no changes could be observed, and it was apparently as perfect as when first made.

Oil of Maize in Pharmacy. C. A. Heinitsch. (*Chemist and Druggist*, August 31, 1889.) The author's experiments show the suitability, and in some respects the superiority, of oil of maize for the preparation of liquor calcis, unguentum diachylon, unguentum hydrargyri nitratis, and emplastrum plumbi.

Castor Oil Adulteration. M. Conroy. (From a paper read before the Liverpool Chemists' Association, November 7, 1889. *Pharm. Journ.*, 3rd series, xx. 385.) The chief distinguishing features of castor oil are its high density (·963 to ·964 at 60° F.),

and its behaviour with petroleum ether; but this behaviour has been incorrectly described in text-books. The author finds that when 20 c.c. of pure castor oil and the same quantity of petroleum ether (7033 sp. gr.) are mixed by brisk agitation in a tall graduated tube, and maintained at a temperature of 60° F., the mixture never becomes clear, and on standing for about an hour, separates a layer of petroleum ether on the surface measuring 3 c.c. But if the castor oil be adulterated with other fixed oils, such as cotton-seed, cocoa-nut, etc., a perfectly clear solution is obtained, and no separation takes place on standing. The presence of as little as 5 per cent. of the adulterant can thus be detected. If the adulterant be cocoa-nut oil, this will betray itself by the odour given off on heating the sample in a small porcelain dish. Cotton-seed oil may be recognised as such by the author's modification of the silver nitrate test, which is applied as follows:—

1. Make a test solution containing 5 parts of silver nitrate and 1 part of nitric acid (specific gravity 1.42) in 100 parts of rectified spirit (specific gravity .838).

2. Pour about 100 grains of the oil under examination into a dry test-tube, about half an inch in diameter, add to it 10 grain measures of the above test solution, and place the tube in *boiling* water for five minutes.

Castor oil assumes a pale yellow colour, but the presence of cotton-seed oil causes it to become deep red.

As regards the specific gravity, the author points out that when castor oil is adulterated with 10 per cent. and over of cocoa-nut oil, the latter separates when the temperature falls to 60° F., and it becomes necessary in such cases to take the density at a higher temperature. He has therefore taken a sample of castor oil possessing a density of .964 at 60° F., and found its density to be .949 at 100° F. A sample of cocoa-nut oil at the same temperature (100° F.) he found to be .912.

The Detection of Resin Oil in Castor Oil. H. Gilbert. (*Chem. Zeit.*, xiii. 1428.) The ordinary tests for castor oil prescribed by the German Pharmacopœia do very well for the detection of fatty oils, but fail in the presence of resin oil. A sample of castor oil recently examined by the author answered all the ordinary tests satisfactorily, but its taste and smell were suspicious. On saponification it was found to contain 19 per cent. of resin oil, and its saponification equivalent was 126, whilst the saponification equivalent of pure castor oil is, according to Valenta, 180–181.5. Pure castor oil, when agitated with an equal bulk of nitric acid of 1.31

specific gravity, is turned slightly brown, the acid remaining colourless. Under the same conditions resin oil is turned almost black, and the acid assumes a yellowish brown tint. The adulterated sample of castor oil yielded, on treatment with nitric acid, the colour reaction of resin oil, but of course in a degree corresponding to the dilution.

Essential Oil of Betel-Leaves. J. F. Eykman. (*Ber. der deutsch. chem. Ges.*, xxii. 2736-2754.) The leaves of *Charica Betle*, when distilled with water, yield a small quantity of a yellowish green oil which has a burning taste, a peculiar, pleasant smell, and is feebly lævorotatory. When shaken with concentrated potash, it is partially dissolved; and on adding sulphuric acid to the solution, a phenol is precipitated. This phenol is described by the author under the name of *chavicol*, and is stated to be a powerful antiseptic, its action on bacteria being five times as strong as that of phenol and about twice as strong as that of eugenol. Its composition is represented by the formula $C_9H_{10}O$. It is a colourless liquid, boils at about 237° , and is soluble in alcohol, ether, chloroform, and light petroleum in all proportions, but only sparingly in water and ammonia. With ferric chloride, the aqueous solution gives a blue coloration, which disappears on adding alcohol.

The fraction boiling at $175-190^\circ$ and insoluble in alkali probably contains several terpenes, perhaps also cymene and cineole, but it is free from pinene; no pure compound could be isolated from the mixture. The fraction boiling at $255-265^\circ$ contains a colourless sesqui-terpene, $C_{15}H_{24}$, boiling at about 260° .

The Oils of Wintergreen and Birch. H. Trimble and H. J. M. Schroeter. (*Amer. Journ. Pharm.*, August, 1889.) Previous investigators have found oil of wintergreen to consist of methyl salicylate and a hydrocarbon, called gaultherilene; and oil of birch to be composed of methyl salicylate alone.

The authors find, in addition to methyl salicylate, in both a hydrocarbon of the formula $C_{15}H_{24}$, and small quantities of benzoic acid and ethyl alcohol. The amount of the hydrocarbon is from 0.3 to 0.447 per cent., and it becomes solid on standing a short time or on cooling. It is probably made up of a solid and a liquid portion.

The oils proved to be physically and chemically identical, the only difference detected being in the melting point of the hydrocarbons. That from wintergreen melted at from 10° to $15^\circ C.$,

and that from birch at 18° C. This may depend on the time of collecting the plants or on the age of the oils.

A representative sample of artificial oil of wintergreen possessed the physical properties but not the chemical composition of the natural oils, nor was it pure methyl salicylate.

The artificial product, when unmixed with the natural oils, may be identified by the addition of excess of potassium hydrate, when all odour of wintergreen will disappear.

In the authors' opinion it would be undesirable, in the next U. S. Pharmacopœia, to replace the almost pure natural oils by an impure methyl salicylate of variable and uncertain composition. No reasonable objection could be offered to the designation by the Pharmacopœia, as oil of wintergreen, of the product from either of the natural sources.

The Oils of Wintergreen and Birch. F. B. Power. (*Pharm. Rundschau*, December, 1889, 283.) The author disagrees with the results obtained by H. Trimble and H. J. M. Schroeter (preceding abstract). His own examination of a number of samples lead him to the conclusion that natural oil of gaultheria consists of methyl salicylate and 0.3 per cent. or less of a lœvogyre terpene; that oil of birch, when pure, consists simply of methyl salicylate, and is inactive towards polarized light; and that neither of them contains benzoic acid or, as far as he has been able to satisfy himself, any ethylic alcohol. He also failed to detect a trace of benzoic acid in a representative sample of artificial oil of wintergreen.

The Oils of Wintergreen and Birch. H. Trimble and H. J. M. Schroeter. (*Amer. Journ. Pharm.*, January, 1890, 9.) This paper is a rejoinder to the statements of F. B. Power (preceding abstract), and a defence of the results published by the authors in their previous report (this volume, page 205).

Oil of Cinnamon. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xx. 749.) The author compares the oils obtained from the leaves and from the bark of trunk and branches. The oil from the leaves contains: eugenol, a hydrocarbon with a cymene-like odour, little benzoic acid, and a still smaller quantity of cinnamic aldehyde; while the oil from the bark consists principally of cinnamic aldehyde.

Examination of the Oils of Cassia and Cinnamon. H. Gilbert. (*Journ. Chem. Soc.*, from *Chemiker Zeitung*, xiii. 1406, 1407.) It is pointed out that oils of cassia and cinnamon may be highly adulterated with resin oils and still pass the tests of the German Pharmacopœia. With nitric acid, sp. gr. 1.45 at 15°, or with 1.50

acid at 6°, both the pure and impure oils give crystals without development of heat; however, with the 1.50 acid at 15° both react violently, with development of heat and without the formation of crystals; therefore, the P. G. test, as neither the sp. gr. nor the temperature of the acid is stated, may lead to the condemnation of a pure oil, and *vice versâ*. By determining the "acid number," the adulteration can be detected, as the following numbers show:—

	Acid Numbers.
Genuine Oil of Cassia (with 6 per cent. non-volatile residue).	13
Genuine Oil of Cassia after forty hours' aëration	13
Genuine Ceylon Oil of Cinnamon (2 per cent. residue).	9
Genuine Ceylon Oil of Cinnamon (2½ per cent. residue).	10
Adulterated Oil of Cassia (28 per cent. residue).	47
Adulterated Oil of Cassia (prepared from pure Oil of Cassia by intermixing 20 per cent. of Colophony).	40
Colophony, sp. gr. 1.08	150

Detection of Adulterations in Oil of Cassia. E. Hirschsohn. (*Pharm. Zeitschr. für Russland*, 1890, 225 and 241; *Amer. Journ. Pharm.*, June, 1890.) Cassia oil may be tested for likely adulterations by the following simple tests: (1) Agitation of the suspected sample with three volumes of petroleum ether, sp. gr. 0.650, should neither produce an increase nor decrease of the volume of oil taken; a decrease in volume would indicate the presence of other essential oils, fixed oils, resin or kerosin; an increase, the presence of larger quantities of castor oil. (2) The clear petroleum-ether layer of the above test agitated for several minutes with copper hydrate (obtained by precipitating copper sulphate solution with solution of potassium hydrate, washing and drying at ordinary temperature) should give no blue or green filtrate; absence of colophony or copaiva. (3) One volume of the oil with three volumes of 70 per cent. alcohol at 15° C. should give a clear or only opalescent solution; should a turbidity or separation take place, the presence of petroleum, fixed oils, other volatile oils or larger quantities of colophony, would be indicated. (4) The above 70 per cent. alcoholic solution mixed, drop by drop, with ½ volume of an alcoholic solution of lead acetate (70 per cent. alcohol saturated at ordinary temperature with lead acetate), should produce no precipitate; absence of colophony or similar resins.

Adulterated Oil of Rosemary. R. A. Cripps. (*Pharm. Journ.*, 3rd series, xx. 415; *Chem. and Drugg.*, Nov. 23, 1889.) Of five

samples of oil of rosemary recently examined by the author, four proved to be adulterated, two with petroleum and two with alcohol. The solubility of these samples in rectified spirit (sp. gr. '838) was as follows:—

1. Pure Oil.	. . . . .	1 in 5
2. Adulterated Oil (petroleum)	. . . . .	about 1 in 20
3. " " "	. . . . .	" 1 in 30
4. " " (alcohol)	. . . . .	1 in $4\frac{1}{2}$
5. " " "	. . . . .	1 in $3\frac{1}{2}$

Sample No. 2 was distinctly fluorescent, and both 2 and 3 were of full yellow colour.

As the petroleum used consists of the heavier portions, it is readily detected by exposing the oil to the heat of a water-bath in an open dish until the odour of rosemary is practically lost. Alcohol is detected by agitating the oil with a particle of magenta; if pure no colour is imparted to the oil, but if adulterated the dye dissolves, the colour being deeper the greater the quantity of alcohol present.

Note on Oil of Cajuput. C. A. Cripps. (*Pharm. Journ.*, 3rd series, xx. 415; *Chem. and Drugg.*, Nov. 23, 1889.) The author has determined the specific gravity of a number of samples of this oil, and suggests that the tests for its purity in the Pharmacopœia should be supplemented by the requirement that the specific gravity of the oil should be from '922 to '926 at 15·5° C.

Norwegian Oil of Carraway. C. Nicolaysen. (*Chem. Zeit.*, xiii. 1704.) The carraway is one of the most widely distributed plants in Norway, growing as far north as 71° of latitude, and in southern Norway, up to 1,098 m. above the sea level. The author has examined the seeds of Norwegian carraway by passing steam through 5 kilos. of the bruised seeds contained in an iron still, obtaining 6·1 per cent. and 6·4 per cent. of oil in two experiments, but of this a considerable proportion was contained in the aqueous distillate, which had to be treated with ether to recover the dissolved oil. Three samples gave, by fractional distillation, 48·9, 47·1, and 48·0 per cent. of carvol respectively, which is less than the average continental oil containing about 64·5 per cent. of carvol and 35·5 per cent. of carvene.

Oil of Andropogon Nardus, or Citronella Oil. T. D. Dodge. (*Amer. Chem. Journ.*, 1889, 456.) According to the preliminary notice the author obtains somewhat different results from those of Kremers. The aldehyde, isolated from the oil by means of a con-

centrated solution of sodium bisulphite, according to Kremers is $C_7H_{14}O$, while the author obtains results corresponding to $C_{10}H_{18}O$, and names the compound citronellic aldehyde.

Massoy Bark Oil. E. F. R. Woy. (*Archiv der Pharm.* [3], xxviii. 22-48.) This oil is obtained from a plant of the *Lauracea*, growing in New Guinea. The crude oil is rather fluid, perfectly clear, and yellow, with an odour resembling that of cloves, and a sharp, burning taste. Its sp. gr. at 10° is 1.0514. Its reaction to litmus is very faintly acid, due to a trace of acetic acid; it contains somewhat over $\frac{1}{2}$ per cent. of water, but is free from sulphur and nitrogen. A detailed investigation shows the constituents of the oil to be a new terpene, safole, eugenol, and small quantities of a creosote-like substance. The new terpene, *massoyene*, $C_{10}H_{16}$, boils at 172° , has a sp. gr. = 0.8619 at 13° , and is dextro-rotatory; it does not agree in character with any terpene hitherto described.

Bay Oil (Oleum Myrciæ Acris). O. Mittmann. (*Archiv der Pharm.* [3], xxvii. 529-548.) The oil is dark yellow to brown in colour, has a sharp taste, an odour somewhat resembling that of cloves, and a sp. gr. of 0.970 at 15° . It is soluble in ether, light petroleum, carbon bisulphide, and chloroform, but becomes turbid with alcohol and other substances easily miscible with water. The oil contains neither sulphur nor nitrogen; its reaction is neutral to litmus. Ferric chloride in presence of alcohol produces a blue coloration, indicating the presence of phenols. Fractional distillation yielded pinene, dipentene, a polyterpene (probably diterpene), eugenol, and the methyl ether of eugenol.

Examination of Essential Oils. H. Hager. (*Chemical News*, May 9, 1890, from *Pharm. Centralhalle*.) The author utilises the behaviour of essential oils with a mixture of equal parts by weight of glycerine (sp. gr. 1.259-1.262) and absolute alcohol. In this manner the oils are divided into two groups, the one forming a turbid solution with two volumes of the alcoholic glycerine, and the other a clear solution. Of the former class some remain turbid, even with 16 volumes of the reagent, whilst others become clear if mixed with 3, 4, 5, etc., volumes.

Notes on Essential Oils. (*Pharm. Journ.*, 3rd series, xx. 263, 264, and 281-283. From Schimmel and Co.'s report, October, 1889.) This communication comprises notices of the oils of angelica root (Japanese), arnica flowers, bay, betel, cassia, citronelle, cloves, elemi, eucalyptus, fennel (Japanese), kesso root, kuro-moji, oli banum, orange-flower, rosemary, thyme, garlic, *Aristolochia subglauca*, *Artemisia Barellieri*, *Artemisia Hispanica*, *Juniperus oxy-*

cedrus, *Lavandula dentata*, *Lavandula Stœchadis Flor*, *Marrubium Alysson*, *Mentha aquatica*, *Ruta graveolens*, *Satureja Thymbra*, *Solidago*, *Teucrium funkianum*, *Thymus capitatus*, and *Andropogon fragrans*. For particulars reference should be made to the *Pharmaceutical Journal*.

Echugin. R. Böhm. (*Centralb. f. d. Med. Wissensch.*, 1889, 892; *Amer. Journ. Pharm.*, April, 1890.) The author analysed the echugin poison, which is a blackish brown, crummy, odourless and intensely bitter mass, obtained from *Adenium Bæhmiinum*, Apocynaceæ, indigenous to the German possessions in south-west Africa. He isolated a crystalline glucoside, echugin, and a resinous body, echugon. The glucoside crystallizes in small, colourless, satiny, rhombic plates, easily soluble in water and alcohol and insoluble in ether. It is present to about 10 per cent. in the crude substance. Echugin is a cardiac poison, death taking place in systole.

Toxic Action of the Albumose from the Seeds of Jequirity (*Abrus Precatorius*). S. Martin. (*Medical Chronicle*, November, 1889; *Chemist and Druggist*, August 10, 1889.) In a previous communication (abstract, *Year-Book of Pharmacy*, 1887) the author demonstrated the presence of two proteids in the seeds of the *Abrus precatorius*, or jequirity plant—a globulin and an albumose—and also discussed the physiological action of the globulin. The present paper deals with the physiological action of the albumose. The symptoms produced by injecting hypodermically the albumose are increasing weakness, with rapid breathing, without convulsions or paralysis. The post-mortem appearances are local œdema or ecchymosis, and gastro-enteritis, with occasionally petechiæ on the serous membranes; the blood usually dark and fluid. When applied directly to the eye, the albumose causes severe conjunctivitis and chemosis.

The poisonous action of the albumose is completely destroyed by boiling the solution. Up to 50° C. no effect is produced; at 70° to 75° C. the albumose is still poisonous, but not nearly to so great a degree as previous to heating; at 80° C. a still further diminution in activity is produced. The action of the albumose in producing conjunctivitis is also diminished by heat. It will be seen that there is a great resemblance in chemical composition between the abrus-poison and the toxic principle of snake-venom. Weir Mitchell and Reichert describe the venom of the rattlesnake as consisting of a globulin and a peptone. The latter, however, is not a true peptone, and is probably closely allied to the albumose class of proteids. If the venom of snake poison is heated, its

activity is diminished and in some cases destroyed, the globulin being coagulated and the peptone-like body decomposed.

The results obtained may be thus summarized:—The toxic principle of the jequirity resides in two proteids present in the seeds—a para-globulin and an albumose, which practically possess the same toxic properties. The activity of both these proteids is destroyed by moist heat. The snake-venom resembles abrus-poison in chemical composition, in its power of producing local lesions, of reducing body temperature and rendering the blood fluid after death, and to some extent in the effect on it of moist heat. Abrus-poison, however, is much less active than snake-venom. The fatal dose of snake-venom varies, according to the species of snake, from 0·0021 gm. to 0·000079 gm. per kilo. of body weight, whilst abrus-poison stands at globulin 0·01 gm., albumose 0·06 gm. per kilo. of body weight.

Ouabaïo — the Poison of the Somalis. M. Cathelineau. (*Journ. Pharm. Chim.*, 1889, 436; *Journ. Soc. Chem. Ind.*, January, 1890.) Along the whole of the west coast of Africa, especially in the country of the Somalis, occurs a tree used by the natives for the preparation of their arrow-poison, and called by them ouabaïo. Its wood is yellowish white, very hard and dense, odourless, but possessing a strong bitter taste. Arnaud has isolated from it ouabaïn, $C_{30}H_{46}O_{12}$, which has a physiological action similar to that of strophanthin, $C_{31}H_{49}O_{12}$, but which is twice as toxic, the poisonous dose being about 0·2 mgrm. per kilo. of body weight.

Local Anæsthetic Action of Strophanthin and Ouabain. Prof. Panas. (*Nouveaux Remèdes*, March 8, 1890; *Amer. Journ. Pharm.*, April, 1890.) In a paper read at a recent *séance* of the French Academy of Medicine, the author presented the following conclusions of results obtained by him with the substances named: “Ouabain, which possesses anæsthetic properties as applied to the eyes of rabbits, does not appear to exercise any action of this kind upon the human eye. Strophanthin has an anæsthetic action upon the human eye, but, owing to its very irritating effects, its use should give way to that of cocaine. The same is true of erythrophleine and other substances proposed to effect local anæsthesia. Thus far, cocaine alone merits the favour of ophthalmologists.”

Pilocarpine in Jaundice. M. Witkowski. (*Pharm. Journ.* From *Therap. Gazette*, January, 1890, 46.) The author considers pilocarpine to be almost a specific in jaundice; so much so, indeed, that if after treatment, lasting from ten to sixteen days, the

jaundice does not disappear, he would attribute it to malignant disease. In one patient, who had suffered for four years, one-sixth of a grain of pilocarpine subcutaneously injected once or twice daily for three weeks caused the disappearance of the jaundice for the three years whilst under observation. Thirty analogous cases treated in a similar manner were followed with equally satisfactory results. The only cases in which it did not succeed were when the jaundice was accompanied by a tumour in the liver. He therefore recommends its use in all cases where the condition of the heart will permit it.

Successful Application of Pilocarpine as an Antidote to Belladonna. D. J. McGowan. (*Brit. Med. Journ.*, Feb. 22, 1890, 420.) The author applied a hypodermic injection of one-third of a grain of pilocarpine to a patient who had accidentally swallowed a large tablespoonful of linimentum belladonnæ. After partial recovery the dose was repeated five hours afterwards, strong coffee and other stimulants being also administered. No perspiration followed the use of the pilocarpine.

The Action of Eseridine. M. Schweber. (*Pharm. Journ.*, from *Merck's Bulletin*.) It has been stated of this new substance, prepared by Bœhringer in a crystalline form, that it partakes only of the therapeutically useful, but not of the obnoxious and dangerous properties of eserine. Particular stress has been laid on its possessing only one-sixth the toxic power of eserine. But the author, after a series of experiments, concludes that eseridine possesses no advantages over eserine. The chief drawback to both, and equally shared by them, detracting in fact from the usefulness of the calabar alkaloids generally, is the ready susceptibility of the heart to their action. In short, the assertion that eseridine is free from the toxic action of eserine, is erroneous.

Manganese in Chlorosis. E. Dieterich. (*Pharm. Centralhalle*, 1890, 327-333; *Amer. Journ. Pharm.*, July, 1890.) Manganese preparations have recently been tried again in the treatment of chlorosis, and excellent results were obtained, especially with a peptonate. The author suggests the following preparation:—

Liquor Ferro-Mangani Peptonatus.—10·0 grams of citric acid are dissolved in 50 c.c. of distilled water, and neutralized with ammonia water (about 20·0 are necessary). 24·0 c.c. of liq. ferri peptonatus (see *Amer. Journ. Pharm.*, 1888, 514) are carefully boiled with 150·0 c.c. distilled water until dissolved, the ammonium citrate solution added, and also a solution of 3·7 pure crystallized manganous chloride in 10·0 c.c. of distilled water. The following

mixture is next added: 500·0 c.c. of distilled water, 100·0 of cognac, 0·75 each of tinctures of Ceylon cinnamon and vanilla, 1·5 of aromatic tincture and 2 drops of acetic ether; finally, sufficient water to make 1000·0. The above directions, when strictly followed, will furnish a preparation containing 0·6 per cent. of iron and 0·1 per cent. of manganese.

Manganese Saccharate, M. Mannitate, and M. Dextrinate.—75·0 grams of pure permanganate of potassium are dissolved by the aid of heat in 4,500 c.c. of distilled water and allowed to cool; 45·0 grams of white sugar or 45·0 of alcohol are added, and after stirring the mixture is set aside for twenty-four hours. The precipitate is washed by decantation with distilled water, until the washings leave no residue upon evaporation; it is then collected upon a cloth strainer and expressed until it weighs 300·0 grams. The moist precipitate is next triturated with 900·0 sugar, mannite, or dextrin, as the case may be, 225·0 solution of sodium hydrate are added and the mixture is warmed in a closed vessel in a steam bath, until a drop taken out dissolves perfectly in water; it is then evaporated to dryness and powdered.

The preparations contain 3 per cent. of manganese; by taking only 225·0 grams of sugar, mannite, or dextrin, instead of 900·0, preparations containing 10 per cent. of manganese can be made. These preparations are easily soluble in water; concentrated solutions are permanent, dilute solutions of the saccharate precipitate after a time, but those of the mannitate and dextrinate are permanent. The solutions can be acidified with *citric acid* without precipitation.

Therapeutic Effects of Hydrochlorate of Spermine. G. A. Stockwell. (*Chemist and Druggist*, March 22, 1890, from *Therapeutic Gazette*.) The author states that recent investigations have proved that subcutaneous injections of this salt have a remarkable influence in restoring health and vigour to those who have suffered from long illnesses, or who, from other causes, are "below par." One remarkable consequence of the injections appears to be the effect upon those who are addicted to alcoholic stimulants. It has been observed that in the course of a few days they lose entirely the craving for drink, owing to the bracing influence of the spermine.

Therapeutic Effects of Codeine. G. Rheiner. (*Medical Chronicle*, December, 1889.) The author briefly records the therapeutic effects of codeine in thirty-five patients, varying in age from a few weeks to seventy-five years, suffering mainly from bronchitis or broncho-pneumonia. His experience leads him to

advocate the use of codeine where a milder narcotic than morphine is desirable, particularly in the bronchitis of children, and adults with no fever or with but slight rise of temperature. The doses given by him were small; $\frac{1}{140}$ th to $\frac{1}{70}$ th of a grain in infants under one year, and from the $\frac{1}{40}$ th to $\frac{1}{30}$ th of a grain up to five years, whilst to adults from $\frac{1}{3}$ to $\frac{1}{2}$ a grain.

Therapeutic Effects of Hydrastinine. Dr. Falk. (*Pharm. Journ.*, 3rd series, xx. 601.) The author has studied the therapeutic effects of hydrastinine, the oxidation product obtained from hydrastine by Freund and Will. He finds that, like ergotine, this base has the property of causing contraction of the vessels. When injected into the circulation it acted very favourably in chronic metritis and uterine bleeding, the injections not being so painful as those of ergotine. Among other instances it gave favourable results in congestive dysmenorrhœa and profuse menstrual bleeding depending upon tissue change in the uterus. A 10 per cent. solution of the hydrochlorate was used, the dose being from one-half syringeful, or equal to 0.05 gram of the salt.

Comparative Activity of the Digitalins. G. Bardet. (*Journ. de Pharm. et de Chim.*, December, 1889.) The author reports recent researches upon amorphous or crystallized digitalin—the digitoxin of German chemists—and with digitalein, which in Germany is called digitalin. He arrived at the following conclusions:—Crystallized and amorphous digitalins, prepared according to the French Codex, are wholly soluble in chloroform. They have an identical activity, and are uniform in their effects. The German digitoxin is incompletely soluble in chloroform, and its activity is from two to three times less than the digitalin of the Codex. French digitalein and German digitalin, both of which are soluble in water and insoluble in chloroform, are not definite products. They have a like activity and therapeutic action, but the action is twenty to twenty-five times less than the digitalin of the Codex or chloroformic digitalin. On the other hand, it is possible that the action upon the heart may not be exactly the same as the action of the digitalin of the Codex.

Diuretin. Dr. Gram. (*Apoth. Zeitung*, Dec. 14, 1889.) This name is applied to a sodio-salicylate of theobromine, which is described as a white powder exceedingly soluble in water, and containing 50 per cent. of the alkaloid. Given in one-gram doses from three to six times a day, it is said to produce copious diuresis without exciting the nervous system and without disturbing digestion.

Orexin. F. Penzoldt. (*Pharmaceutische Zeitung*, 1890, 115.) Orexin is the name given by the author to phenyldihydrochinazolin hydrochlorate, which is found to be a true stomachic, creating an appetite and assisting the digestion of foods. The remedy seems to act by producing local irritation, and may be prescribed in gelatin-coated pills, as follows :

Orexin Hydrochlor.	. . . . .	2·0
Extract. Gentianæ,		
Pulv. Rad. Althææ	. . . . .	āā q. s.
M. ft. pilulæ No. 20.		

S. 3-5 pills to be taken once or twice daily with a cup of beef tea.

Orexin. Dr. Martius. (*Deutsch. med. Wochenschr.*, 1890, 427.) The author has published the results of a large number of experiments made with a view to determine how far the claims recently put forward on behalf of orexin as an appetite producer have a foundation in fact. The general results of his experiments have not afforded any distinct evidence of the action of orexin in this direction.

Hydracetin in Psoriasis. M. Oestreicher. (*Apotheker Zeitung*, July 20, 1889, 763.) The author confirms the value of this remedy in psoriasis, but adds that its application in the form of ointments has in almost every instance been followed by severe prostration and other symptoms of poisoning. In his opinion, a substance capable of producing such symptoms should be subjected to more prolonged clinical observation as to the necessary limits of doses before it is recommended for general medicinal use.

Anthrarobin and Goa Powder. Dr. Mühe. (*Apoth. Zeitung*, March 1, 1890, 105; *Pharm. Journ.*, 3rd series, xx. 789.) The author gives the following tests for distinguishing these two substances. The anthrarobin prepared by Prof. Liebermann, and recommended as a substitute for chrysarobin, is a yellowish white powder, which in the dry condition is fairly permanent, especially if it be sheltered from light; after a time, however, it becomes somewhat darker through oxidation. The colour therefore differs from the brown-yellow of Goa powder. If 0·1 gram of anthrarobin be shaken with 20 grams of 2·5 per cent. borax solution, it dissolves immediately to a clear yellow liquor, the froth having the same colour, while Goa powder under the same conditions only partly dissolves, and forms a turbid brown liquid with brown froth. In dilute soda or ammonia liquor

anthrarobin forms at once a yellow-brown solution, which shaken in contact with air becomes quickly green, then blue, and eventually violet; Goa powder gives a beautiful violet-red solution, the colour of which is very permanent and not altered by contact with air. Another readily distinctive test is the reaction with concentrated sulphuric acid, anthrarobin forming a deep brown-yellow solution, without froth (re-formation of alizarin), and Goa powder dissolving with frothing and a red-yellow colour.

Aristol as a Remedy for Skin Diseases. F. Goldmann. (*Apoth. Zeitung*, 1890, 45.) The author states that *aristol* or *diodo-dithymol* is especially valuable in the treatment of psoriasis and lupus. It should be dissolved in ether or fixed oils without the application of heat. It is formed of a brownish red, amorphous and odourless powder by the action of a solution of iodine in potassium iodide upon a solution of thymol in sodium hydrate.

The Analgesic Action of Methylacetanilid (Exalgin). T. R. Fraser. (*Brit. Med. Journ.*, Feb. 15, 1890, 344.) Exalgin was administered fifty-two times in neuralgic affections, ranging from facial neuralgia to cardiac angina, and on only four occasions did it fail to give relief. The doses given were half a grain or a grain, the relief occurring as a rule most promptly and lasting longer when the larger dose was given. In cases where the pain was not likely to be removed by any substance that did not produce general narcotism, such as carcinoma of the liver, aneurism of the aorta and lumbar abscess, exalgin was of no use. But the author thinks that although the analgesic power of exalgin is not very great, it may take a useful and important place among the remedies by which pain is relieved, on account of the freedom of its action from the disturbances and inconveniences associated with the action of nearly all other pain-subduing agents.

Ethyl Bromide as an Anæsthetic. H. Thoms. (*Pharmaceutische Zeitung*, 1889, 705.) Ethyl bromide is now much used in dental operations in preference to chloroform, laughing-gas, and cocaine. Its success is ascribed to the purity of the chemical as at present made from alcohol, potassium bromide and sulphuric acid. The pure substance is easily decomposable, but the addition of one per cent. of alcohol or ether retards or prevents the decomposition. The specific gravity of pure ethyl bromide at 15° C. is 1.4735, while that containing 1 per cent. alcohol is 1.457 at 15° C. Tests of purity are:—(1) The absence of colour when shaken with an equal volume of concentrated sulphuric acid, and (2) Water

agitated with ethyl bromide, after separation, should not show an acid reaction nor give a turbidity with silver nitrate solution.

Therapeutic Application of Naphthalene. C. R. C. Tichborne. (*Med. Press and Circular*, Dec. 11, 1889.) The author suggests that the powerfully antiseptic and germicide properties of naphthalene might be utilized in the treatment of typhoid fever. For this purpose, its relative insolubility in most solvents is regarded by him as an advantage, as it would pass through the bowels undigested. It may safely be given in two-grain doses, either dissolved in oil and emulsified, or in the form of a fine powder obtained by precipitation in pouring a solution of the compound in strong alcohol or glacial acetic acid into cold water while stirring.

Phenylurethane, another New Antipyretic. Prof. Giacomini. (*Pharm. Zeitung*, Dec. 4, 1889.) The compound introduced under this name by the author as a powerful antipyretic is a white crystalline powder insoluble in water but soluble in alcohol, and is said to result from the combination of aniline with chlorocarbonic ethyl ether. As an antipyretic it is stated to be equal to twice its weight of antipyrine and to be particularly useful in articular rheumatism. It is also credited with analgesic properties. The dose is given as 0.5 gram.

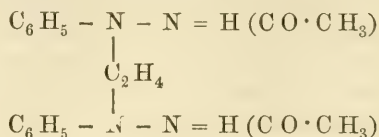
Orthin, a New Antipyretic. R. Kobert. (*Deutsch. Medicin. Wochenschr.*, 1890, No. 2.) The name orthin is given by the author to orthohydrazineparahydroxybenzoic acid,—



The free base is very unstable, but the hydrochloride is a stable body which reduces the persalts of the heavy metals and which possesses a marked antiseptic action. Experiments with animals have shown that it can be administered without injurious results. It is probable that orthin hinders the processes of oxidation going on in the system, and that it reduces the temperature by increasing the ease with which heat is given up by the body, by extending the pores of the skin. Solutions of 1 to 10,000 of orthin had no injurious effect on the heart of a frog. Parahydrazine salicylic acid has a similar physiological action to its isomer, orthin. The author does not consider that the latter is likely to be much employed as an antipyretic.

Two New Antipyretics. A. Michælis. (*Pharm. Centralhalle*, Jan. 16, 1890, 35. From *Pharm. Journ.*) Two new compounds have been added by the author to the list of antipyretics. One of

them is called acetylenphenylhydrazin, and is said to be obtained by acetylizing ethylenphenylhydrazin, which itself is formed by the action of ethylene bromide upon sodium-phenylhydrazin. It is described as occurring when crystallized from alcohol in colourless needles, melting at 220°C ., and having the composition represented by the formula,—



The other compound is called ethylenphenylhydrazinsuccinic acid. It is said to be obtained by dissolving equal parts by weight of ethylenphenylhydrazin and succinic anhydride in alcohol, and boiling; from the liquid, which is clear at first, the acid quickly separates under strong ebullition, and in such abundance that the liquid solidifies to a paste. This acid is described as being soluble in hot water and difficultly soluble in alcohol, and as crystallizing in needles that melt at 203°C .

Methacetin. A. Weller. (*Pharmaceutische Zeitung*, July 10, 1889.) The author confirms previous observations respecting the valuable antipyretic and antiputrescent properties of this new remedy (see *Year-Book of Pharmacy*, 1889, p. 206). As regards its chemical constitution, it differs from phenacetin in containing a methyl group in the place of an ethyl group. It resembles phenacetin in most of its chemical reactions, but may be distinguished from it by its lower melting point (127°C .) and its much greater solubility in water, one part being soluble in 526 parts of cold and in twelve parts of boiling water, while phenacetin requires five to seven times those quantities respectively. It is freely soluble in alcohol, chloroform, and fixed oils; less so in benzol, and difficultly soluble in ether, carbon bisulphide, petroleum spirit, and volatile oils. It crystallizes in colourless and odourless scales.

Somnal, a New Hypnotic. (*Pharm. Zeitung*, 1889, 611.) This new hypnotic is obtained by the union of chloral, alcohol, and urethane. Its composition is represented by the formula $\text{C}_7\text{H}_{12}\text{Cl}_3\text{O}_3\text{N}$, differing from chloral-urethane by containing two more carbon and four more hydrogen atoms in the molecule. It fuses at 42° , does not react with silver nitrate, and is not acted upon by acids. It is administered according to the following

prescription:—Somnal, 10·0; distilled water, 45·0; extract of licorice or syrup of raspberries, 20·0, in tablespoonful doses (containing 2 grams). The advantage claimed for somnal is that when administered in two-gram doses it induces within half an hour a quiet sleep that lasts from six to eight hours, without the objectionable after-effects of chloral hydrate or urethane.

Sulphonal. R. Percy Smith. (*Lancet*, Nov. 23, 1889, 1051.) The author reports observations of ataxic and other disturbances following in some cases the administration of sulphonal, and justifying the impression that in some instances it interferes with the cortical motor functions. In all the cases, however, suspension of the administration of the sulphonal was attended by an immediate disappearance of the unpleasant symptoms, and, in some, readministration after an interval produced no bad effect.

Sulphonal. Dr. Marandon. (*Brit. Med. Journ.*, March 8, 1890, 570.) The author confirms the statements of R. Percy Smith (see preceding abstract), having observed symptoms of paresis, ataxia, dulled intelligence, loss of appetite, nausea, and frequent vomiting as consecutive to treatment with sulphonal. The symptoms were observed in fourteen out of eighty cases of mental alienation in which this substance was employed.

Sulphonal. Dr. Sutherland. (*Lancet*, Nov. 23, 1889, 1,053.) The author has found sulphonal to be a most valuable sedative in chronic insanity, where the attacks of excitement are recurrent; but in cases where the excitement is continuous its effects are apparently injurious, by increasing the state of excitement of the patient on the following day.

Sulphonal. C. K. Bond. (*Lancet*, Nov. 23, 1889, 1,053.) The author arrives at the conclusion that sulphonal is of great value in the insomnia of typhus, in inducing sleep without the disadvantage attending the administration of some other hypnotics of causing stupor leading up to coma.

Physiological Action of Sulphonal. J. Gordon. (*Brit. Med. Journ.*, i. 1890, 710–714.) From observations and experiments on the lower animals and on human beings, the following conclusions are drawn:—Sulphonal reduces the excitability of the reflex function of the spinal cord, and diminishes peripheral sensation. In men, large doses slacken the respiration, but do not affect the pulse. It destroys slowly the conductivity of motor nerves, and the irritability of muscles, which subsequent washing with salt solution tends to revive. Urea is excreted in increased quantity after small doses (5–10 grains), in diminished quantity after

larger doses; the volume of the urine is, however, not affected. It produces no effect on the skin, or on the body temperature; it, however, occasionally causes vomiting and diarrhœa. Although incoordination of the extremities, giddiness, and a feeling of depression or confusion sometimes follow its administration, as a rule these effects do not supervene, and the sleep which follows its use is tranquil and refreshing. The hypnotic action of the drug is marked even in healthy people, and in cases of insomnia it is found most trustworthy.

Chloralamide, a New Hypnotic. Dr. von Mering. (*Pharmaceutische Centralhalle*, 1889, 484 and 494.) This new hypnotic is

chloral-formamide, $\text{C Cl}_3 \text{C} \begin{smallmatrix} \text{O H} \\ \diagup \text{---} \text{H} \\ \diagdown \text{---} \text{H C O N H} \end{smallmatrix}$, a combination of chloral

anhydride $\left(\text{C Cl}_3 \text{C} \begin{smallmatrix} \text{O} \\ \diagup \text{---} \text{H} \\ \diagdown \text{---} \text{H} \end{smallmatrix} \right)$, and formamide $\left(\begin{smallmatrix} \text{H} \\ \text{H C O N H} \end{smallmatrix} \right)$. It forms colourless crystals, soluble in nine parts of water and in one and a half parts of alcohol. Its taste is mild, slightly bitter, but not biting. The watery solution keeps well; but when heated or in the presence of alkali, chloral hydrate and ammonium formate are produced. It has been given in doses of two to three grams (30 to 45 grains); sleep is usually produced in one-half to three-quarters of an hour. No unpleasant after-symptoms and no circulatory disturbances have been observed.

Chloralamide as a Hypnotic. Drs. Hagen and Hüfler. (*Münch. med. Wochenschr.*, 1889, 513.) The authors have administered this remedy in a number of cases in doses from two to three grams in wafers or dissolved in wine, and are well satisfied with its action. They prefer it to chloral hydrate, on account of its more pleasant taste, its more perfect hypnotic action, and its being less liable to produce unpleasant after-effects.

Chloralamide, the New Hypnotic. D. R. Paterson. (*Lancet*, 1880, 849; also *Chemist and Druggist*, Nov. 30, 1889.) The author finds that this new hypnotic is not quite free from some of the disadvantages attending the use of others, since in some instances doses of 30 grains and 45 grains were followed by giddiness, feeling of sickness, dryness of mouth, and even slight delirium. On the whole, however, he expresses himself satisfied with it, its slower action as compared with chloral hydrate, being fully compensated by the more prolonged sleep it produces, and the comparative absence of disturbing effects on the circulation.

Chloralamide, the New Hypnotic. W. H. White. (*Brit. Med. Journ.*, Nov. 2, 1889, 969.) The author records his experience of this substance, and arrives at the conclusion that it is a safe hypnotic, which rarely has any depressing effects, does not produce indigestion, and in the great majority of cases gives rise to no unpleasant results.

Chloralimide as a Therapeutic Agent. MM. Behal and Choay. (*Répertoire*, March 10, 1890, 109; *Pharm. Journ.*, 3rd series, xx. 789.) The authors state that this preparation, which should not be confounded with "chloralamide" (chloral formamide), possesses remarkable antipyretic and analgesic properties. It is claimed to surpass chloral ammonia or chloral formamide in activity, while it presents the advantage of being stable and free from unpleasant taste and odour. It is given in doses of 0.25 to 0.50 gram. This preparation, the composition of which corresponds to the formula $\text{C Cl}_3 - \text{C} \begin{smallmatrix} \text{H} \\ \diagup \\ \text{N} \text{H} \end{smallmatrix}$, was first described by Pinner and Fuchs, who obtained it by the action of ammonium acetate upon chloral hydrate (*Ber. der deutsch. chem. Ges.*, x. 1,068). The authors now claim that it can be obtained in a state of greater purity as a residue from the action of heat upon chloral-ammonia. The product so obtained is described as forming long colourless and tasteless needles, slightly soluble in water, rather soluble in alcohol, and very soluble in ether. It is very stable, not being altered by air, light, or moisture, or by heating in a sealed tube to 150° C. in the presence of water; but at 180° it is said to be decomposed into chloroform and formamide. In contact with a liquid, acidulated with a mineral acid, it is stated to be decomposed into chloral and the corresponding ammonia salt, but this reaction does not occur with organic acids.

Incompatibility of Antipyrine and Chloral Hydrate. M. Blainville. (*Bull. Comm.*, 1889, 278.) The author finds that antipyrine and chloral hydrate form a crystallizable compound having a slight taste entirely different from that of either of its constituents.

Antipyrine and Chloral Hydrate. L. Reuter. (*Apotheker Zeitung*, January 25, 1890, 45.) The observation that antipyrine and chloral hydrate are capable of forming a compound differing in taste from either of the components is confirmed by the author, who describes this combination as "trichloraldehydphenyl-dimethylpyrazol." The compound fails to produce the effects characteristic of either of its constituents, and appears to be

therapeutically inert. It is found to be odourless and tasteless, and to be only slightly soluble in cold alcohol, ether or chloroform, but rather more soluble in boiling water and boiling alcohol. It yields no chloroform when treated with cold solutions of caustic alkalies, but is decomposed on boiling with such solutions, yielding chloroform, isonitril, antipyrine and decomposition-products of the latter.

Antipyrine and its Incompatibles. E. J. Millard and A. Campbell Stark. (*Pharm. Journ.*, 3rd series, xx. 860.) The authors give an interesting account of a series of experiments undertaken by them with the object of testing the compatibility of antipyrine with a large number of chemical and pharmaceutical preparations. As the paper is not suited for abstraction, we simply call attention to it in this place, and refer the reader to the source above quoted.

Hypnal, the Combination of Chloral Hydrate and Antipyrine. M. Bardet. (*Nouv. Rem.*, March 24, 1890. From *Pharm. Journ.*) L. Reuter has shown that by heating antipyrine with chloral hydrate a crystalline compound could be obtained, which he alleged to be without therapeutic value. (See p. 221). According to the experience of the author, however, this crystalline compound, which he proposes to call "hypnal," partakes in a marked degree of the properties of both its constituents. Administered in twenty-two cases in doses of one gram (two grams being rarely required) he found hypnal to induce sleep as readily as chloral hydrate, whilst in those instances where the insomnia was caused by pain, it seemed to have the same anodyne effect as antipyrine. In addition, spasmodic symptoms, especially cough, appeared to be much abated under its influence. The author states that hypnal consists of about 45 per cent. of chloral and 55 per cent. of antipyrine. It has been found out by M. Bonnet that if concentrated solutions of the two constituents be shaken together, a considerable deposit of crystals is formed without passing through the oily stage, and this deposit, by recrystallization from water, can be obtained in enormous transparent rhombic crystals. If the chloral used be in excess, the crystals take the form of prismatic needles. The compound is said to be free from odour or caustic taste and from the bitterness of antipyrine: it has a saline taste, a slight but not disagreeable sensation of chloral becoming perceptible on the tongue after some time. Hypnal is said to dissolve in six to eight times its weight of warm water and melt at 58-60°; it is therefore much less soluble than chloral hydrate or antipyrine;

while as to its melting point, it lies about half-way between the two. When heated with a dilute base chloral and antipyrine are re-formed, and upon heating the solution the characteristic odour of chloroform is given off.

Antipyrine and Chloral Hydrate. MM. Béhal and Choay. (*Journ. de Pharm. et de Chim.*, May 15, 1890, 539. From *Pharm. Journ.*) A reclamation for priority has been put forward by the authors on account of the discovery of the compounds formed by antipyrine with chloral hydrate. They point out that in the Paris Exhibition of 1889 two such compounds were exhibited, and they state that the compound described by Reuter is a third modification that no longer gives the reactions of antipyrine. When concentrated solutions of equal weights of chloral hydrate and antipyrine are mixed, an oily layer is formed, which after a short time crystallizes. If the quantities used be in the proportion of 4·7 grams of chloral hydrate and 5·3 grams of antipyrine, dissolved each in 5 grams of water by the aid of a gentle heat, large crystals may be obtained of a compound containing equal molecules of antipyrine and chloral, and represented when crystallized from alcohol by the formula $C_{13}H_{13}N_2Cl_3O_2$. This has been designated "monochloralantipyrine." It melts at 67–68° C., dissolves in water at 14° C. to the extent of 7·85 grams in 100 grams, gives with ferric chloride the characteristic blood-red colour of antipyrine, gives rise to chloroform when heated with potash in aqueous solution, and reduces Fehling's solution when warmed. If this compound be kept heated to about its fusing point for a time, there are gradually deposited in the melted mass crystals of a compound corresponding to a product of dehydration, and this, according to the authors, is the substance obtained by Reuter. It is insoluble in water, melts at 186–187° C., and can be distinguished easily from monochloralantipyrine by no longer giving the reaction with ferric chloride. If instead of using the constituent compounds in equal molecular proportions, a concentrated solution of chloral hydrate be used in excess, an oily layer is similarly formed, from which prismatic needles are obtained containing two molecules of chloral to one of antipyrine, and therefore named "bichloralantipyrine." This also melts at 67–68°, but is more soluble than monochloralantipyrine, the proportions being 9·98 grams in 100 grams of water at 14° C. It gives with ferric chloride the red coloration of antipyrine, and reduces Fehling's solution when heated. In water it appears to undergo some degree of dissociation, the first crystals deposited from a saturated solution being

those of monochloralantipyrine, and afterwards those of the bichloral compound.

Antipyrine as an Antigalactic. Dr. Salemi. (*Amer. Journ. Pharm.*, October, 1889, from *Bull. gén. de Thérap.*) Antipyrine has been successfully used by the author as an antigalactic. Using 0.5 gm. three times a day, the mammary secretion was diminished on the first day and ceased on the third day.

Pyoktanin, a New Antiseptic. (*Pharmaceutische Zeitung*, 1890, 261.) This new antiseptic, introduced by E. Merck, is one of the aniline dyes which for a long time have been known to destroy bacteria and bacillus of all kinds. The violet aniline dyes in solutions 1:30,000 retard the growth of bacteria, and in 1:2,000 to 1:1,000 prevent putrefaction. Two dyes are at present put upon the market, a *blue* one, Pyoktaninum cœruleum, and a *yellow* one, Pyoktaninum aureum, the former used for surgical, the latter for ophthalmic purposes. Of each can be obtained, dusting powders 1 and 2 per cent., ointments, pencils, pastilles for making solutions, and dressings 1 per cent. The experiments leading to the discovery of the value of these preparations were made by Prof. Stilling, of Strassburg.

A New Antiseptic. J. Lister. (*Chemist and Druggist*, November 9, 1889.) The antiseptic recommended is a double cyanide of mercury and zinc, and is prepared as follows:—

A soluble double cyanide of mercury and potassium is dissolved, and to it a soluble salt of zinc is added; the precipitate formed is the double cyanide, which should be well washed with water to free it from any soluble cyanides, as they cause irritation and suppuration if placed on a wound in the shape of gauze.

One in 2,000 of double cyanide keeps blood serum and corpuscles from putrefaction, but if the wound has developed bacteria a much stronger solution or powder or gauze must be used. Gauze is prepared in the following way:—The double cyanide is triturated with starch, and water is added to this, the result being a somewhat leather-like mass. The water is strained off, and to the mixture of double cyanide and starch sulphate of potassium is added. This enables the mixture to be easily powdered, and, when it is dry, it is a fine white powder. In order to fix this powder on gauze, 3 per cent. or 5 per cent. of it is suspended in a 1 in 4,000 solution of mercuric chloride, when, by the agency of the starch, it sticks so firmly that it cannot be washed off except with difficulty.

Physiological Action of Hydrocyanic Acid. N. Gréhant. (*Comptes Rendus*, cix. 502-503; *Journ. Chem. Soc.*, December, 1889.) Experiments were made on dogs in two ways—(1) by successive injections of amygdalin and emulsin; (2) the injection of very dilute hydrocyanic acid (0·25 per cent.). 2·2 c.c. of the dilute acid injected into the jugular vein of a dog was sufficient to cause death in 9·5 minutes. The symptoms follow one another in this order: convulsions, insensibility of the cornea, cessation of respiration, stoppage of the heart. The heart continues to beat for several minutes after respiration has ceased; in the case of frogs, the heart's action may continue for more than an hour after the animal has ceased to breathe.

Harmlessness of Potassium Ferrocyanide. P. Carles. (*Journ. de Pharm. et de Chim.* [5], xx. 486-489.) The evidence collected by the author confirms the conclusion that this salt is not poisonous.

Therapeutic Application of Zinc Sulphide. M. Barduzzi. (*Apotheker Zeitung*, 1889, 1184.) Precipitated zinc sulphide has been used both internally and externally, with good results, in chronic eczema and psoriasis. For internal use the author prescribes: zinc sulphide, 0·50; extract of gentian, sufficient to make 50 pills; from 3 to 12 pills are taken daily. For external application the following formula is recommended: zinc sulphide, 5·0; lanolin, 20·0; lard 30·0.

Occurrence of Mercury in Tapeworms. L. Oelkers. (*Ber. der deutsch. chem. Ges.*, xxii. 3316, 3317.) Two tapeworms were observed to have a peculiar grey colour due to the presence of a mercury compound. They were obtained from a syphilitic patient undergoing mercurial treatment.

A New Antidote for Strychnine. (*Pharmaceutische Zeitung*, October 12, 1889, 625.) Formyl-p-amidophenol ether is recommended as a physiological antidote to strychnine on account of its great power of checking the tetanic convulsions induced by the latter. It is a compound analogous to phenacetin, containing however a formyl in the place of an acetyl group, and not sharing the antipyretic properties of phenacetin. It is said to be obtained by heating the hydrochloric acid compound of p.-amidophenoethyl ether with sodium formate and formic acid, and boiling the fused mass with water.

Relative Proportions of Strychnine and Brucine in Extract of Nux Vomica. H. Beckurts. (*Pharm. Centralhalle*, October 3, 1889, 574.) The author's determination of strychnine and brucine

in the total alkaloid obtained from five samples of extract of nux vomica shows the following results :—

	I.	II.	III.	IV.	V.
Strychnine .	48	53·6	42·7	53·1	45·6
Brucine . .	52	46·4	57·3	46·6	54·4

This great variation in the relative proportions of the two alkaloids, considered in conjunction with the fact that the activity of strychnine is nearly forty times greater than that of brucine, induces the author to suggest that in standardising preparations of nux vomica, the proportion of strychnine only, instead of that of the total alkaloids, should be taken into consideration.

Detection of Aloes in Extract of Cascara Sagrada. L. Reuter. (*Pharm. Zeitung*, December 7, 1889.) This admixture may be detected, according to the author, by Klunge's test. If 2 drops of the extract diluted with 10 c.c. of water are mixed with 5 drops of a 10 per cent. solution of copper sulphate, the mixture, if the extract was pure, will have a bluish green colour, while in the presence of extract of aloes it will be yellow. If now 2 c.c. of a 20 per cent. solution of sodium chloride and a few drops of alcohol be added to the mixture, the colour remains unaltered if the extract was pure, but it changes to a purple-red if aloes was present.

The reaction is said to succeed still better if about 10 drops of the extract be evaporated to dryness, the residue taken up with water, and the filtered solution submitted to the test.

Liquid Extract of Cascara Sagrada. J. Findlay. (*Pharm. Journ.*, 3rd series, xx. 491; *Chem. and Drugg.*, December 21, 1889.) The author finds that this preparation when made with water is almost as active as it is when made with a mixture of four volumes of rectified spirit to twelve of water. He therefore thinks that the laxative effect of the bark cannot be entirely due to resinous constituents insoluble in water.

Tasteless Fluid Extract of Cascara Sagrada. H. M. Beck. (*Chemist and Druggist*, May 24, 1890.)

Cascara Sagrada, in No. 40 powder	. 100 parts.
Magnes. Calcinat.	. . . 1 „
Spir. Vini Rect.	. . . 100 „
Aquæ, q.s.	. . . 100 „

Mix the alcohol and water in the proportions of 2 parts of alcohol to 3 parts of water, and moisten the mixed powders thoroughly with the menstruum, then let it stand until the bitter-

ness has disappeared, and pack in a cylindrical percolator, not too firmly, and pour on menstruum. When the liquid begins to drop from the percolator, close the lower orifice, and proceed according to the U.S.P. method of preparing fluid extracts.

This extract carefully prepared has, according to the author, a pleasant taste, and is quite as active as the bitter fluid extract. He states that the tonic property of the bitter extract may be destroyed by the magnesia, but this can be remedied by combining it with some substance having tonic properties, such as nux vomica or cinchona. The organic constituents of tasteless extract are volatile and fixed oils, a yellow crystalline and sublimable substance, glucose, brown colouring-matter, yellow, red, and brown resins, tannin, and a second crystalline substance.

Marrubiin and Fluid Extract of Marrubium. F. G. Hertel. (*Amer. Journ. Pharm.*, June, 1890.) On preparing a fluid extract of horehound by means of dilute alcohol, it was noticed that after standing about a week, a deposit of well-defined crystals separated from the finished extract. When heated on platinum foil the crystals melted, then charred, and finally volatilized without leaving any residue. They were quite soluble in chloroform, alcohol, and ether, and slightly soluble in water. The principle is insoluble in benzine, is not coloured by acids, does not respond to Fehling's test for sugar, nor to the alkaloidal group-reagents, and from its alcoholic solution is not precipitated by lead subacetate. The slight yellow colour of the needle-shaped crystals was removed by several recrystallizations from alcohol; they retained their slowly developing but persistently bitter taste. The deposit from the 10 pounds of herb amounted to nearly one ounce, and the fluid extract appeared to be as bitter as before. By precipitating the fluid extract with basic lead acetate, filtering, treating with H_2S , and concentrating the filtrate, more crystals were obtained.

The *National Dispensatory* states that Harms obtained 30 grains of marrubiin from 25 pounds of the herb; but neither his process nor that devised by Kromayer, both starting with an infusion of the herb, appear to be the best that can be devised, owing to the sparing solubility of the principle in water.

The author comes to the conclusion that dilute alcohol is not a suitable menstruum for the preparation of this fluid extract. Using a liquid composed of 3 parts of water and 3 parts of alcohol, with 5 per cent. of glycerin, the deposition of crystals commenced even before the fluid extract was finished. A menstruum prepared from 2 parts of alcohol and 1 of water, with 5 per cent. of

glycerin, yielded a fluid extract remaining free from crystalline deposit.

Essence of Senna Pods. C. Symes. (*Pharm. Journ.*, 3rd series, xx. 394.) Two samples of pods yielded 0·72 and 0·80 per cent. of purified cathartic acid respectively.

The author concurs in the opinion expressed by E. W. Bell, that extraction by pressure is the process best adapted for the preparation of an essence or fluid extract. He suggests the following formula :—

Senna Pods, slightly bruised	.	.	.	1 pound.
Rectified Spirit	.	.	.	5 ounces.
Distilled Water	.	.	.	12 „

Press the pods well down in the containing vessel, and pour on them the mixed spirit and water; in twelve hours reverse the position of the pods, and allow to stand a further period of twelve hours. Subject to strong pressure, set aside the liquid in a bottle, break up the marc, and pour thereon the following, previously mixed :—

Glycerine	.	.	.	.	1 ounce.
Liquid Ammonia	.	.	.	.	20 minims.
Distilled Water	.	.	.	.	19 ounces.

Allow to stand four hours, press strongly, strain and evaporate the liquid so obtained until, when well mixed with the first liquid and filtered, 16 fluid ounces will be produced. The addition of one drop of each of oil of carraway and ess. oil of almonds, with two drops of essence of lemons, makes it quite palatable.

The medium adult dose is 1 fluid drachm.

Concentrated Infusions and Decoctions. C. D. Moffat. (*Pharm. Journ.*, 3rd series, xx. 682.) The author pleads in favour of the retention of these preparations, and deals with the methods best calculated for their production. For particulars reference should be made to the original paper.

Ethereal Tincture of Capsicum. J. Sawyer. (*Lancet*, May 17, 1890, 1066.) The author recommends a tincture of capsicum made with ether instead of rectified spirit, as a local application in cases of subacute gout, chronic gout, chronic articular rheumatism, muscular rheumatism, and some cases of bronchial catarrh and chronic bronchitis. Among other advantages claimed for such a tincture, attention is called to its ready miscibility with oil of turpentine as well as with fatty oils. A mixture of

equal parts of ethereal tincture of capsicum, liquor ammoniæ, oleum terebinthinæ, and oleum lini, is said to form an excellent rubefacient liniment.

Tincture of Strophanthus. G. M. Beringer. (*Amer. Journ. Pharm.*, September, 1889.) The author recommends the removal of the oil from the dried and powdered seeds by means of petroleum ether, and the subsequent preparation of the tincture with a menstruum composed of seven volumes of alcohol (sp. gr. 0·820) and one of water. A tincture thus made is stated to keep well without any signs of precipitation. He also recommends that the tincture should not be prescribed in aqueous solution, as L. Larmuth has shown that the bitter principle, when dissolved in water, soon undergoes some change and greatly increases in toxicity.

Tinctura Quininæ Ammoniata. G. Lunan. (*Pharm. Journ.*, 3rd series, xx. 794.) The improvement suggested by the author consists in the substitution of carbonate of ammonia for the hydrate in the official tincture. The product forms a clear solution with 13 parts of distilled water, whereas the present tincture requires 26.

In freshly-drawn aerated waters this proposed tincture is miscible in all proportions, whereas the present tincture requires from six to seven parts to form a clear solution.

The formula used is :—

Carbonate of Ammonia (32·5 per cent.				
N H ₃)				323 grains.
Quinine Sulphate				160 grains.
Distilled Water				10 fl. ounces.
Rectified Spirit				10 „ „

Dissolve the carbonate in the water, add the spirit and the quinine, shake until dissolved, and filter, making the product measure 1 pint with distilled water. This is done almost as expeditiously as by the present method, and gives a preparation containing rather over 2 grains of carbonate of ammonia (equal to 1·25 per cent. N H₃) and 1 grain of sulphate, equal to ·918 grain of quinine carbonate (C₂₀ H₂₄ N₂ O₂, H₂ C O₃ ·H₂O) in each fluid drachm.

Identification of Tinctures. F. X. Moerk. (*Rundschau*, 1889, 714; *Amer. Journ. Pharm.*, October, 1889.) L. von Itallie has published tests of identity for the following tinctures :—

Tincture of Aloes.—If this tincture be agitated with ether, and

to the separated ethereal solution water of ammonia added, a red-violet coloration results.

Tincture of Calumba.—The yellowish green residue obtained by evaporating a little of the tincture is dissolved in dilute hydrochloric acid, and if to this solution is added a small quantity of chlorine or bromine water, a light red colour is produced.

Tincture of Cinchona.—Two grams are precipitated by solution of lead subacetate, filtered, evaporated, the residue dissolved in water, a few drops of sulphuric acid added, and again filtered. The filtrate is tested for quinine or quinidine by the thalleioquin test.

Tincture of Colchicum.—Three grams are evaporated, the residue dissolved in water, the solution filtered, the filtrate agitated with chloroform, and the chloroformic solution evaporated; the residue, with nitric acid, will be coloured violet, changing to brown, on addition of potassium hydrate solution becoming orange-coloured.

Tincture of Digitalis.—Five grams are evaporated, 2 c.c. of water added, and precipitated with a small quantity of solution of lead acetate. After filtering the filtrate is agitated with chloroform, and to the residue, after the chloroformic solution has evaporated, is added a little sulphuric acid and a few drops of bromine water; a violet coloration appears.

Tincture of Gelsemium.—One gram is evaporated, 1 c.c. of acidulated water added, filtered, the filtrate rendered alkaline with water of ammonia, and shaken with chloroform. Gelsemine remains upon evaporation of the chloroformic solution, which, with sulphuric acid and potassium bichromate, yields a red-violet colour. The alkaline solution (after the removal of the chloroform solution) diluted with water possesses a blue fluorescence.

Tincture of Guaiac is coloured blue by oxidizing agents; a blue colour is also obtained upon addition of cupric sulphate and bitter almond water.

Tincture of Ipecac. is evaporated, the residue taken up with acidulated water, filtered, made alkaline with potassium hydrate solution, and shaken with ether. The residue from the ethereal solution gives a brown colour, with a solution of ammonium molybdate in concentrated sulphuric acid, and upon the immediate addition of a drop of hydrochloric acid a blue colour soon appears.

Tincture of Jalap yields a residue turning red with sulphuric acid.

Tincture of Nux Vomica evaporated with dilute sulphuric acid

gives a violet colour; the residue treated with water, filtered, the filtrate made alkaline and extracted with chloroform, leaves a purified residue, upon the evaporation of the chloroform, which with nitric acid is coloured red, or with concentrated sulphuric acid and potassium bichromate assumes a violet colour.

Tincture of Quebracho, 5 grams are evaporated, the residue dissolved in acidulated water, filtered, rendered alkaline with potassium hydrate, and agitated with chloroform; the chloroform residue is coloured blue by sulphuric acid and potassium bichromate, or a red colour is produced by boiling with dilute sulphuric acid and adding potassium chlorate.

Assay of Ipecacuanha Wine. T. P. Blunt. (*Pharm. Journ.*, 3rd series, xx. 380.) The author has further investigated the process suggested by him some time ago (*Year-Book of Pharmacy*, 1889, p. 397), and arrives at the conclusion that the process is untrustworthy.

Assay of Ipecacuanha. A. Lyons. (*Zeitschr. für analyt. Chem.*, xxviii. 258, 259.) 10 grams of the powdered root are digested for twenty-four hours with 40 c.c. of water in a warm place, and then further for three days after making up to 100 c.c. with alcohol. 25 c.c. of the clear liquid is then acidified with sulphuric acid, and warmed until the alcohol is expelled. It is again made up to 25 c.c. with water, and titrated with Mayer's potassium-mercuric iodide reagent, of which 1 c.c. = 0.0189 gram of emetine. Flückiger (*Pharm. Zeit.*, xxxi. 30), extracts 10-20 grams of ipecacuanha powder in a Soxhlet's apparatus with chloroform to which 1 c.c. of liquid ammonia has been added, distils off the chloroform, and weighs the emetine after drying at 100°. The author finds 1.65 to 3 per cent., Flückiger only 1 per cent., of emetine in the root.

The Assay of Opium. F. A. Flückiger. (*Archiv der Pharm.* [3], xxvii. 721-732, 769-772.) The following is recommended as a handy and fairly accurate process:—8 grams of opium powder are placed in a folded filter of 12 cm. diameter, with a little tapping, and dried at 100°. After half an hour 10 c.c. of ether, mixed with 10 c.c. of chloroform, is poured over it, the covered funnel being frequently struck, and finally 10 c.c. more of chloroform is poured on. After all possible liquid has run through, the filter with its contents is opened out, and dried at a gentle heat. Next the powder is vigorously and repeatedly shaken in a flask with 80 c.c. of water, and filtered after two hours; 42.5 grams of the

filtrate are well and often shaken in a weighed flask with 7.5 c.c. of alcohol (0.83 sp. gr.), 15 c.c. of ether, and 1 c.c. of ammonia (0.96). After six hours the contents of the flask are poured on to a double-folded filter of 10 cm. diameter, and the morphine is washed on to the filter with about 10 c.c. of water. This is dried, returned to the dried flask, and dried at 100° until its weight becomes constant.

Assay of Opium. G. Looff. (*Apotheker Zeitung*, 1890, 271; *Amer. Journ. Pharm.*, July, 1890.) The advantage claimed for this process, as compared with others, is stated to consist in the greater purity of the morphine yielded by it. 5 grams of the finely-powdered opium are triturated with water and made up to 78 grams; after frequently agitating during one to two hours, 60.8 grams (representing 4 grams of opium) are filtered off, and 0.2 grams of oxalic acid are dissolved in it. After one half hour 5.2 grams of a solution of potassium carbonate (1:2) are added, thoroughly mixed (avoiding unnecessary agitation) and 16.5 grams filtered at once through a dry plaited filter of 12 cm. diameter into a tared flask of 30 c.c. capacity. To the 16.5 gram filtrate (representing 1 gram of opium) add 5 grams of ether free from alcohol, cork the flask, and agitate briskly for ten minutes; the ether is then evaporated by use of a small rubber blast, the morphine collected on a small plain filter, and thoroughly washed with water saturated with ether, dried at 40–50° C., returned to the flask, which has been dried in the meantime, and weighed to constant weight.

The addition of the oxalic acid is made to precipitate calcium salts, which are present in all opium varieties excepting Salonica opium, which gives no perceptible precipitate; by the use of a large excess of potassium carbonate the narcotine is completely and immediately precipitated, while no morphine is precipitated in the minute's time necessary to filter off the 16.5 gram filtrate.

This method has also been applied to the examination of *extract* and *tincture of opium*. 2.5 grams of *extract* are dissolved in water with the addition of 0.2 gram of oxalic acid, diluted to 70 grams, 5 grams of solution of potassium carbonate added, 15 grams filtered off (corresponding to 0.5 gram of extract), etc., as above.

50 grams, with 0.2 gram of oxalic acid, are evaporated to a thin extract and gradually diluted with water to make 70 grams; to this add 5 grams of solution of potassium carbonate, and filter off 15 grams (corresponding to ten grams of tincture), and proceed as above.

Determination of the Diastasic Power of Extract of Malt. R. A. Cripps. (*Pharm. Journ.*, 3rd series, xx. 481.) The author refers to the very discordant results of published determinations of the digestive power of malt extracts. He suggests the following modification of methods of estimation previously published by others:—

1. Prepare a mucilage by mixing 1 gram of potato starch or arrowroot (dried in an oven at 212° F.) with 10 c.c. of cold water, add 100 c.c. of boiling water, and boil the whole for half an hour; allow to cool to about 100° F., and make up the measure to 100 c.c.

2. Dissolve 5 grams of the sample of extract of malt in water sufficient to produce 50 c.c. of solution.

3. Dissolve 1 gram of iodine in 100 c.c. of water by the aid of .2 gram of iodide of potassium.

50 c.c. of starch solution is introduced into a flask or bottle and kept in a water-bath at a temperature of 98° to 100° F. until it has attained that temperature, when 5 c.c. of the malt solution is added (also at 98–100° F.), gently shaken to mix thoroughly, and replaced in the water-bath; after five minutes and at intervals of five minutes (or less if found desirable), 4 c.c. of the liquid is poured into a test-tube containing 1 c.c. of the iodine solution. A good extract of malt will give no indication of starch or dextrin, after ten, or at most, fifteen minutes, while one which still gives a distinct coloration after thirty minutes should be rejected as quite unfit for use; that is, *extract of malt should completely digest its own weight of potato starch in ten to fifteen minutes at 98–100° F.*

Preparations of Quebracho. L. S. Risley. (*Amer. Journ. Pharm.*, April, 1890.) The author suggests several galenical preparations of quebracho bark, viz.:

Extractum Quebracho Fluidum.—Quebracho bark in No. 30 powder, 16 oz.; alcohol; 9 fl. oz.; water, 5 fl. oz.; and glycerin 2 fl. oz. Proceed by the pharmacopœial process for similar preparations.

Elixir Quebracho.—Fluid extract of quebracho, 1 fl. oz.; magnesium carbonate, 2 drachms; mix thoroughly, then add aromatic spirit (Nat. Formulary), 180 minims; tincture of vanilla, 120 minims; syrup, 1 fl. oz., and aromatic elixir sufficient for 1 pint.

Extractum Quebracho.—The bark is exhausted with a mixture of alcohol 9, and water 5 parts, the tincture is evaporated, and glycerin, 5 per cent., incorporated with the extract.

Glycerinum Belladonnæ. W. Johnston. (*Pharm. Journ.*, 3rd series, xx. 769.) The following slight modification of Martindale's

recipe is stated to give excellent results, both as regards rapidity of manipulation and consistence of finished preparation. Take of—

Extract of Belladonna	2 ounces.
Glycerine	2 fl. ounces.
Warm Water	5 fl. drachms, or a sufficiency.

Place the extract in a warm mortar, and rub it smooth with four drachms of the water gradually added; mix in the glycerine, and transfer to a bottle; rinse out the mortar with the remainder of the water, and shake the rinsings with the main portion, making the final measure four fluid ounces.

Natural and Artificial Salicylates of Soda in Mixtures containing Sal Volatile or Sweet Spirit of Nitre. C. F. Henry. (*Pharm. Journ.*, 3rd series, xx. 782.) The author shows that the red coloration produced in mixtures of sweet spirit of nitre or sal volatile with artificial salicylate of soda is not due to impurities in the latter. It occurs equally well and even more markedly with salicylate of soda made from natural salicylic acid.

Incompatibility in Prescriptions. J. W. England. (*Amer. Journ. Pharm.*, January, 1890.) The author presents a series of notes in which he endeavours to give, not an exhaustive list of special incompatibles, but simply a general expression of those liable to occur in the everyday routine of prescription work.

Resin Soap as an Emulsifying Agent. H. Collier. (*Pharm. Journ.*, 3rd series, xx. 751.) The resin soap employed by the author was prepared by boiling gently for two hours, in an evaporating dish, 1800 grains of resin with 300 grains of caustic soda dissolved in 1 pint of distilled water. Upon cooling the soap separates as a yellow pasty mass, which is drained from the liquid, well squeezed, then heated on a water bath until it becomes dry and friable, and finally rubbed to powder in a mortar.

Compared with *sapo durus* and *sapo mollis*, this resin soap has a more powerful emulsifying effect upon oils, etc., and possesses the advantage of not becoming gelatinous. Compared with tincture of quillaia it appears to give greater viscosity to liquids, so that suspension of the emulsified oil, etc., is more perfect. It readily breaks up the globules of mercury, and forms a perfect and permanent emulsion with chloroform.

The author gives details showing how it may be used for emulsifying such substances as fatty oils, volatile oils, tar, creasote, spirit of camphor, tincture of tolu, thymol, and copaiba.

Lotio Hydrargyri Nigra. T. C. Henderson. (*Chemist and Druggist*, December 21, 1889.) In order to prevent oxidation in this preparation, the author suggests the introduction of a small quantity of glycerine, proceeding thus :—

Take of

Calomel	.	.	.	.	.	.	60	grs.
Glycerine	.	.	.	.	.	.	3	j.
Lime Water	.	.	.	.	.	.	q.	s.

Rub up the calomel with the glycerine, and transfer it to a bottle; add 4 ounces of lime water, and shake well; then add sufficient lime water to produce 1 pint.

This preparation is stated to keep well and to contain the black oxide in a finer state of division. For those who use large quantities of this lotion, the calomel and glycerine may be kept readily mixed (1 drachm of calomel in 1 ounce of glycerine), and the requisite quantity taken, and lime water added as required.

Purification and Preservation of Lard for Pharmaceutical Purposes. J. L. Demoville. (*Amer. Journ. Pharm.*, April, 1890.) The author finds the alum process for purifying lard all that can be desired. The lard is melted, a little powdered alum being stirred in, then strained, cooled, and upon an inclined slab rubbed briskly with a muller, while a stream of water is allowed to trickle over it.

For preserving the lard experiments were made with benzoin, balm of Gilead buds, storax, salicylic acid, turpentine, and tolu. The best results were obtained by using one per cent. of balsam of tolu; the lard was white, kept well, and had its peculiar odour well masked by the slight but pleasant odour of the balsam.

Improvement in the Application of Vaseline as an Ointment Base. V. Krebs. (*Journ. de Pharm. et de chim.*, October 1, 1889.) The author finds that vaselin may be rendered readily miscible with water or aqueous solutions by the aid of castor oil. Two drops of the oil should be used for each gramme of the liquid to be mixed, this being sufficient to produce a perfectly homogeneous product. The only disadvantage of the use of vaselin being thus overcome, its employment as an ointment base may be much extended, especially in the preparation of ointments such as that of iodide of potassium, whose tendency to decomposition, when made with ordinary fats is well-known.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Seidlitz Powders. J. H. Hoseason. (*Pharm. Journ.*, 3rd series, xx. 492; *Chemist and Druggist*, December 21, 1889.) The author suggests the introduction of this popular remedy, together with tests for purity and strength, into the Pharmacopœia. Commercial specimens exhibit very great variations in composition.

Note on the Dilution of Cow's Milk in Infant Feeding. G. Smith. (*Pharm. Journ.*, 3rd series, xx. 3.) The author's formula is mainly based on a process devised by Frankland ("Experimental Researches," 843). The albuminoids, fat, and milk-sugar are by calculation made to approximate as nearly as possible to the average of these constituents in human milk.

Finely ground Oatmeal	$\frac{1}{2}$ oz., gradually
increasing to	. . . . . $\frac{1}{2}$ oz.
Fresh Butter	. . . . . 1 drachm.
Milk Sugar	. . . . . 2 "
Fresh Cow's Milk	. . . . . 6 fluid ounces.
Pure Water	. . . . . 4 "
Salt	. . . . . 5 grains, or a sufficiency.

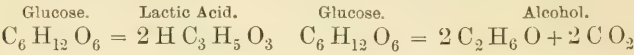
Mix gradually the water with the oatmeal, milk-sugar, and salt, so that no lumps are formed in the mixture, then add the milk and butter, and heat to the boiling point in a clean, enamelled saucepan. The product should be made up to the measure of half a pint, if necessary, and given lukewarm with a spoon when required.

The oatmeal was introduced as a useful attenuant, and it has been found to act as a laxative, and also as a direct fat and heat producer in the process of digestion.

Matzoon. A. Tscheppe. (*Pharm. Journ.*, 3rd series, xx. 67.) Matzoon is a peculiar milk preparation, stated to be a fermented product, although there is no evidence of its having undergone alcoholic fermentation. It is devoid of gas, and appears as a viscid liquid, showing a rather coarsely granular mass of precipi-

tated casein, well suspended in a serum which corresponds to that obtained from sour milk. Although betraying great richness from its appearance, the analysis gives amounts of casein as corresponding to undiluted milk and two-thirds of its cream.

	1 fl. oz. of Cow's Milk contains grains (average).	Kumyss from Milk.	Dr. Brush's Kumyss.	Matzoon.
Sugar . . .	22	—	—	20
Casein . . .	14	14	10	14
Fat . . .	15	15	9	7
Lactic Acid . .	—	1.5	3	.1



Glucose yields by fermentation :—

Alcohol	48.5 per cent.
Carbonic Acid	46.5 „
Glycerin	3.6 „
Other Products	1.4 „

Menthol as an Internal Remedy. (*Brit. Med. Journ.*, 1889, 1419.) Dana states that in doses of five to twenty grains menthol gives a pleasant feeling of warmth, stimulates the cardiac action without increasing its rapidity, and raises the arterial blood pressure. He also recommends it in preference to antipyrin for weakly and anæmic individuals, to whom the administration of antipyrin is not without danger, owing to its tendency to cause collapse. It is in the headaches of neurasthenic and anæmic individuals that menthol has been found especially valuable, as well as in migraine and supra-orbital neuralgia. Its virtues as an antiseptic appear to be fully established. In the diarrhœa of abdominal catarrh, when the bile duct is obstructed and the bile does not enter the intestine, the administration of five to twenty grains generally proves an efficient remedy.

Iodide of Ethyl in Bronchitis. R. Main. (*Brit. Med. Journ.*, 1889, 1216.) The author has found an inhalation of 10 minims of the iodide of ethyl extremely beneficial in cases of bronchitis and bronchial catarrh, complicated with Bright's disease and fatty heart, especially when the dyspnœa is urgent and the bronchial secretion viscid; about five minutes after inhalation free expectoration results. He believes that this action of the iodide is worthy of attention on the part of medical practitioners.

Eucalyptus Spray in Whooping-Cough. W. W. Hardwick. (*Lancet*, 1889, 901.) The author reports that he has obtained good results in the treatment of whooping-cough with a spray of a mixture consisting of eucalyptus oil, two drachms; terebene, two drachms; and rectified spirit, one ounce and a half. The spray is usually ordered to be used half an hour before each meal, and at bedtime. At the same time a drop dose of terebene, suspended in water by means of carbonate of magnesia, with the addition of compound tincture of camphor, is administered every three hours.

Salicylic Acid as a Remedy for Colds. S. W. Hope. (*Brit. Med. Journ.*, 1889, 1092.) The author testifies to the value of salicylic acid in the treatment of ordinary colds. He states that if it be applied to the irritated lining membrane of the nose when sneezing manifests itself, and before any inflammatory action is established, a single application will be found sufficient to abort a common cold. The formula that he suggests is as follows:—

R Sodii Salicylatis	℥ iv.
Acid. Boracis (pulv.)	ʒ j.
Cocainæ Hydrochlor.	gr. xxii.
Mix by agitation.	

Antipyrine in Asthma. C. Smith. (*Med. Chronicle*, March, 1889.) The author reports favourably on the action of antipyrine in asthma. Thirty grains of antipyrine administered at the commencement of a paroxysm gave complete relief in ten minutes. A slight recurrence on the following day was promptly subdued, and for a period of five months the patient has been free from attacks. The patient has been subject to frequent attacks for several years.

Nitroglycerin in Asthma. A. Hoffmann. (*Pharm. Journ.*, 3rd series, xx. 1060.) Subcutaneous injections of nitroglycerin, in doses of 0·0005 to 0·001 gram, are recommended by the author in angina pectoris and severe asthma. The effect of the injection is said to be remarkable, and no objectionable by-effects have yet been observed.

Borax in Epilepsy. J. S. Risien Russell and J. Taylor. (*Lancet*, May 17, 1890.) The authors direct attention to the value of borax in epilepsy. The results obtained in twenty cases lead them to state that it is well worthy of a trial in cases where bromides have failed, or are badly borne. It is given in doses of 10 grains, increased to 20 grains, three times a day. In some cases a scaly eruption appeared, which disappeared when arsenic

was administered; and in one case vomiting occurred, which ceased when aromatics were combined with the borax.

Eulyptol. (*Pharm. Zeitung*, 1890, 21.) Eulyptol is a mixture containing salicylic acid, 6 parts; carbolic acid, 1 part, and eucalyptus oil, 1 part. The name should not be mistaken for *eucalyptol*, the important constituent of oil of eucalyptus.

Lard Substitutes for Ointments. (*Pharmaceutische Zeitung*, 1889, 745.) (1) Lanolin, 65 parts; paraffin oil, 30 parts; and ceresin, 5 parts. (2) Anhydrous lanolin, 35 parts; vaselin, 53 parts; white ceresin, 7 parts, and distilled water, 5 parts. The latter preparation is known as "adipatum," and is useful in preparing stock ointments (rancidity being impossible), and in making ointments containing silver nitrate or potassium permanganate.

Oleate of Morphine. S. A. McDonnell. (*Chemist and Druggist*, October 26, 1889.) For making a 10 per cent. solution extemporaneously, the author gives the following directions:—

Acid. Oleici	.	.	.	.	.	.	gr. 450
Morphinæ Sulphatis	.	.	.	.	.	.	„ 53

Mix, place on a water-bath, apply heat, and add gradually liq. ammon. conc., 25 minims, stirring constantly until a perfect solution takes place. Some specimens of morphine sulphate may require a few drops more or less ammonia to effect a solution. The heat dissipates any free ammonia, while any possible resulting ammon. sulph. does not seem to show itself, nor is there any indication of the formation of a soap.

Mel Rosæ. E. Daenen. (*Chemist and Druggist*, March 15, 1890.) The following is stated to yield a superior preparation:—Infuse 100 grammes of bruised red-rose petals with 400 c.c. of boiling distilled water for six hours. Strain, again infuse for six hours in 200 c.c. of boiling distilled water, and repeat, if necessary, with another 200 c.c. Mix the infusions, and evaporate to 170 grams, filter, and in the filtrate dissolve 500 grammes of clarified honey, and 330 grams of white sugar.

Cocaine and Iron Mixture. Dr. Luton. (*Répertoire de Pharm.*, January 10, 1890.)

Water, sweetened with Saccharin	.	.	.	.	.	125 grams.
Liq. Perchloride of Iron	.	.	.	.	.	2 „
Hydrochlorate of Cocaine	.	.	.	.	.	25 centigrams.

Dose for adults, a tablespoonful every two hours.

For infants, the amount of cocaine is reduced to 10 cgm., the dose being one dessertspoonful. With this, ice should be given internally. The author says that the use of this mixture makes the tearing away of false membrane, cauterization, etc., unnecessary. He adds that he has not for a long time had in his practice a case of death from angina. He had previously claimed for cocaine the power of aborting variola and varioloid, if used in the beginning of the attacks.

Creosote Mixture. A. Eichlecher. (*Druggists' Circular and Chemist and Druggist.*)

Creosote	½ drachm.
Extract of Malt	4 ounces.
Bitter-almond Water	2 „
Emulsion of Cod-liver Oil (50 per cent.)	10 „

Dose: One or two tablespoonfuls three times a day, after meals.

This the author has found to be a pleasant remedy, combining the effects of creosote and cod-liver oil, aiding digestion by means of the malt, and the almond-water exerting a slight sedative influence upon the bronchial mucous membrane. The usual flavour for the above emulsion consists of the oils of orange, bitter almonds, and wintergreen.

Preparations of Creosote. Dr. Bouchard. (*Journ. de Pharm. et de Chim.*, September 15, 1889.) The author uses the following formulæ: Creasote, 10 gm.; almond soap, pulv., 25 gm.; make 100 pills. Dose: 1 every two hours daily, until 8 or 10 have been taken. In giving creasote in larger doses, the following formula is used: Creasote, 50 gm.; cod-liver oil, q.s. to make one l litre. Pour the oil gradually on to the creasote while stirring. A tablespoonful contains 75 cgm. of creasote, and may be given morning and night.

Emulsion of Balsam of Tolu. P. Vigier. (*Soc. de Pharm. de Paris*, July 3, 1889.) The author recommends the following:—Balsam of tolu, 5 gm.; gum arabic (pulv.) 10 gm.; orange-flower water, 10 gm.; syrup of laurocerasus, 30 gm.; water, 100 gm. The balsam is first melted with 10 gm. of 80 per cent. of alcohol.

Salol Emulsion. M. Jouisse. (*Chemist and Druggist*, from *Nouveaux Remèdes.*) The author communicates the following formula for a palatable emulsion of salol. The drug is insoluble in water, and when the alcoholic solution is mixed with water it

is immediately precipitated, and cannot be properly diffused in that way. The formula for the emulsion is:—

Salol	5j.
Powdered Gum Arabic	5j.
Powdered Tragacanth	grs. x.
Tincture of Tolu	5ijss.
Syrup of Tolu	3j.
Water, to	5iij.

Triturate the salol with the powdered gums, and make into a cream with water; to this add the syrup, pour the tincture into the rest of the water, and mix with the first portion.

Preparations of Salol. (*Amer. Journ. Pharm.*, March, 1890.) At a meeting of the Paris Society of Pharmacy, December 4, 1889, some preparations of salol were presented under the names of *salol-santal*, *salol-copaiba*, and *salol sweet almond oil*. The author of the communication stated that salol dissolved quite freely, not only in the above-named liquids, but also in oil of turpentine, the fixed oils, and liquid paraffin.

Permanganate of Potash Pills. M. Vincens. (*Nouveaux Remèdes*, April, 1890.) The author recommends the following formula:—Permanganate of potassium, 1 gm.; pure clay, 5 gm.; distilled water, 15 to 30 drops. Macerate the clay with q. s. of water to make a soft paste, and incorporate the permanganate of potassium. The pills are homogeneous, smooth, and break up readily in the stomach. They should be dried slightly and rolled in powdered talc. They are not attacked by organic matters, and the salt does not decompose.

Sal Ammoniac Lozenges. E. Dieterich. (*Chemist and Druggist*, May 3, 1890):—

Ammonium Chloride, in fine powder .	300 grains.
Liquorice Juice, in fine powder . .	600 "
Liquorice Root, in fine powder . .	300 "
Oil of Anise	2 drops.
Oil of Fennel	2 "

Mix, and make into a mass with glycerinated water (1 in 6). Roll out and divide into 200 lozenges, which may be dried at 68–78° F. Sprinkle with powdered liquorice, or “glaze” by moistening with rectified spirit.

Castor-oil Chocolate. J. Giraud. (*Pharm. Zeitung*, June 22, 1889, 384.) A purgative chocolate, in which the taste of castor-oil is well masked, is obtained, according to the author, by incor-

porating 50 grams of the oil with 50 grams of powdered cacao freed from fat, and 100 parts of powdered sugar, with a sufficient addition of vanilla to impart to the whole a distinct flavour. The ingredients should be well worked up upon a heated slab, and allowed to cool in moulds.

Formula for the Administration of Guaiacum as an Emmenagogue. C. Menière. (*Amer. Journ. Pharm.*, January, 1890.)

Res. Guaiac.	. . . . .	250	grams.
Carbonate of Sodium	. . . . .	12	„
Pimenta	. . . . .	60	„
Alcohol of 60 per cent.	. . . . .	100	„

Macerate for eight days in a dark cool place, filter, and add spirit of ammonia, 4 grams; volatile oil of mint, 1 gram. Keep in yellow bottles perfectly sealed. The dose is one teaspoonful in good wine, three times a day, before eating. It is said to have a more reliable action than the other emmenagogues in use.

Medicinal Gelatines. (*Medical Chronicle*, March, 1890.) These preparations are indicated in superficial inflammatory affections when the skin is swollen, wet, and itchy. Very high temperatures and profuse sweating forbid their use. For a general basis the following formula is given—the figures within parentheses being taken when a hard zinc gelatine is wanted.

R. Zinc Oxide	. . . . .	15	(10)
Gelantine	. . . . .	15	(30)
Glycerine	. . . . .	25	(30)
Water	. . . . .	45	(30)

Cerussa, iodide of lead, white precipitate, sulphur, iodoform, chrysarobin in fine powder, may be mixed in any proportion required. From 5 to 10 per cent. added to soft zinc gelatine is recommended.

Carbolic and salicylic acid, resorcin, naphthol, creasote and sulphide of potassium may be added to the hard gelatine basis in any proportion up to 10 per cent.

Fats, balsams, tars, and ichthyol all make the basis softer. The proportion added is usually from 10 to 20 per cent.

Powders may be combined in any proportions.

Tannin, pyrogallol, and oxide of mercury cannot be added to the basis.

Corrosive sublimate up to 3 per cent., camphor, chloral, and camphor chloral all to 2 per cent., ext. cannab. indic. from 2 to 5 per cent., may be used with soft zinc gelatine.

The different glues should be dispensed in pots, which are to be put in boiling water when the preparation is to be used. It is to be painted on the skin with a long-haired brush.

Medium for Mounting Starches and Pollens. A. P. Brown. (From *Amer. Journ. Pharm.*) The author recommends the following :—

Selected Gum Arabic	3ij.
Glycerin,	
Distilled Water	āā f3iss.
Thymol	gr. j.

These are all placed in a wide-mouthed bottle, which is corked carefully to exclude dust, and placed in a warm situation. It takes several days to effect a perfect solution, the mixture being stirred up occasionally. When all is dissolved, strain through linen and set aside the liquid about a week longer, to get rid of air bubbles and to allow any small particles that may have passed through the strainer to settle to the bottom; or it can be filtered through absorbent cotton by using a funnel for hot filtration, which consists of a double tin case holding water, kept at the required temperature by a spirit lamp placed under the projecting arm. A glass funnel fits inside the hot-water bath, a plug of absorbent cotton is placed in the funnel, and the solution is passed through it. After filtration it is best preserved in compressible tubes.

Unguentum Lanolini. H. Helbing. (*Pharm. Journ.*, 3rd series, xx. 496; *Chemist and Druggist*, March 1, 1890.) In a paper on ointment bases, the author suggests the following formula as yielding a very satisfactory preparation :—65 parts of anhydrous lanolin, 30 parts of liquid paraffin, 5 parts of cerasin, are melted together, and 30 parts of water incorporated into the mixture. The product has a smooth, almost white appearance, and is quite free from stickiness. It mixes readily with its own weight of water, and is found to serve well as an ointment base for either official or non-official preparations.

Caledonian Balsam. Dr. Forné. (*Journ. de Pharm. et de Chim.*, 1890, 504.) The author calls attention to a preparation under this name, which consists of a solution of kauri gum in an equal weight of alcohol of 90 per cent. He states that it has been used with great success in the treatment of wounds and ulcers of all kinds. When applied to a well-cleansed and dried wound it causes a very slight but brief sensation of burning, but after a few moments the

solvent evaporates, and the resin is left as a very adherent varnish, which is not affected by friction or contact with water.

Diachylon Wound Powder. E. Dieterich. (*Pharm. Central-halle*, 1890, 158.) 5.0 parts of lead plaster and 2.0 of yellow wax are agitated with 20.0 parts of ether in a flask until solution or perfect disintegration of the lead plaster results. 45.0 parts of wheat starch, 45.0 of talcum, and 3.0 of boric acid, all in very fine powder, are mixed in a mortar, then the ethereal solution added, perfumed with one drop each of the oils of wintergreen and bergamot, and exposed on parchment paper at ordinary temperature until the volatilization of the ether. This powder is valuable as a dusting powder in chafing, sore feet, etc.

Sozoiodol Dusting-Powder. Dr. Ostermayer. (*Deutsche Mediz. Wochenschr.*) A powder composed of sozoiodol, 10, and powdered starch or talc, 90 parts, is recommended by the author in burns caused by direct flame, hot steam or chemicals, like caustic alkalis. The powder is odourless, not poisonous, allays pain, and prevents supuration.

Salol Dusting-Powder. Dr. Kiezer. (*Amer. Journ. Pharm.*, April, 1890.) Salol dusting-powder, composed of salol, 1, and starch, 8 parts, has done excellent service to the author in cases of wounds, burns, ulcers, defects of the skin, etc.

Iodized Cotton-Wool. MM. Bréaudet and Cathelineau. (*Répertoire de Pharm.*, xlv. 529.) Ethereal and alcoholic iodine solutions, when brought into contact with the skin, irritate and even cauterise, whilst the absorption of iodine is limited. Good results are obtained by using iodine cotton-wool, from which the iodine is liberated by very gentle heat. It is prepared as follows:—Carefully cleaned cotton-wool is put for a few minutes into 2 per cent. aqueous sodium carbonate, washed, and then kept for half an hour in 4 per cent. bleaching powder solution. It is washed until free from alkali, and kept for a quarter of an hour in water acidified with 5 per cent. hydrochloric acid; it is again washed and dried. Finely powdered iodine (8 parts) is strewn over the sheets of cotton-wool (100 parts), which is then lightly rolled together and heated in a glass bottle until iodine vapour is given off. The bottle is then stoppered and heated for two hours in a water-bath. The iodine cotton-wool is kept in well-closed glass vessels.

Zinc Ointment with Mucilage of Gum Tragacanth. P. Vigier. (*Soc. de Pharm. de Paris*, July 3, 1889.) The author proposes the following as a homogeneous and unalterable preparation:—

Vaselin, 30 gm.; oxide of zinc, 4 gm.; gum tragacanth pulv., 2 gm.; distilled water, 10 gm.; tincture of benzoin, 30 drops; powdered soap, 25 cgm. The oxide of zinc should be triturated in a mortar with the vaselin and added to the tragacanth mucilage previously prepared in another mortar. The soap is then introduced, and finally the tincture. It should be kept in closed jars.

Phenolated Celluloid. M. Desesquelle. (*Répertoire*, August 10, 338. From *Pharm. Journ.*) Under the name "phenolated celluloids," the author describes a class of preparations that may possibly find useful application as dressings for wounds. They are made by macerating pharmaceutical gun cotton at the ordinary temperature in one of the liquids formed by the combination of a phenol with camphor. The pyroxylin gradually swells, and by agitation of the mixture there is obtained a kind of homogeneous paste, more or less viscous according to the proportions employed, and resembling collodion. When spread upon a level surface this liquid forms after a time—through the evaporation of the camphor—a very adherent, solid, and transparent varnish.

Dr. Unna's Formulæ. (*Monatshefte für prakt. Dermatologie*. From *Chemist and Druggist*.) W. Mielck, of Hamburg, who has made Dr. Unna's preparations for many years, communicates the following approved formulæ :

Gelatina Zinci Dura.

	Pts.
Gelatinæ albæ	4
Zinci oxidi	3
Glycerini	5
Aquæ	9

Fiant lege artis gelatinæ, pts. 21; quibus si vis admiscere potes

Picis liquidæ, vel
Ext. cannabis ind., vel
Resorcini, ptm. 1.

Gelatina Zinci Vulgaris.

	Pts.
Gelatinæ albæ	3
Zinci oxidi	3
Glycerini	5
Aquæ	9

Fiant lege artis gelatinæ pts. 20; quibus si vis admiscere potes

Sulphuris præcipitat, ptm. 1, vel.
Ammonii sulphoichthyolici, ptm. $\frac{1}{2}$ -1.

Pasta Lithargyri c. Amylo.

Plumbi oxidi	Pts.
Aceti	6
	18
Coquendo et evaporando inter agitationem fiat massa pul-	
tiformis, cui refrigeratæ admiscee	

Amyli	Pts.
Aquæ	5
iterum coquendo et glycerini	15
	20
admiscendo fiat lege artis pond. partium 40.	

Pasta Zinci.

Zinci oxidi	Pts.
Terræ siliceæ	10
Adipis benzoati	2
	28
Lege artis terendo misceantur.	

Pasta Zinci Mollis.

Calcis carbonatis præcipitatæ
 Zinci oxidi
 Olei lini
 Aquæ calcis ana partes æquales
 Lege artis misceantur.

Pasta Zinci Sulphurata.

Zinci-oxidi	Pts.
Sulphuris præcipitati	6
Terræ siliceæ	4
Adipis benzoati	2
	28
Lege artis terendo misceantur.	

Spiritus Capillaris.

Resoreini	Pts.
Spiritus, 95°	5
Spiritus coloniensis	150
Olei ricini	50
	2
Solvantur ut fiat liquor limpidus.	

Unguentum Simplex.

Axungia benzoatæ	Pt.
Olei benzoati vel styracinati ptm. dimidiam.	1
Non confundendo sed conterendo commisceantur.	

Unguentum Acidi Salicylici cum Creasoto.

		Pts.
Acidi salicylici		4
Creasoti faginei		8
Unguenti simplicis		4
vel		
Plus usque ad		5
Ceræ flavæ		4
vel		
Minus usque ad		3

Leni calore colliquendo et probe subigendo fiat unguentum. Unguenti et ceræ ratio inter se secundum aeris temperaturam differt.

Unguentum Compositum Chrysarobini.

	Pts.
Chrysarobini	5
Acidi salicylici	2
Ammonii sulphoichthyolici	5
Vaselini flavi	88

Misce fiat unguentum.

Unguentum Compositum Pyrogalloli.

	Pts.
Acidi pyrogallici	5
„ salicylici	2
Ammonii sulphoichthyolici	5
Vaselini flavi	88

Misce fiat unguentum.

Unguentum Compositum Resorcini.

	Pts.
Resorcini	5
Ammonii sulphoichthyolici	5
Acidi salicylici	2
Unguenti simplicis	88

Misce fiat unguentum.

Unguentum Pomadinum.

	Pts.
Olei theobromæ	2
„ amygdalarum	4
Æstate; vel hieme usque ad	6
Olei rosarum	8

Unguentum Pomadinum Compositum.

	Pts.
Sulphuris præcipitati	4
Resorcini	2
Unguenti pomadini	100

Misceantur.

Unguentum Refrigerans.

	Pts.
Unguenti simplicis	12
Aqua rosæ	2
Aquæ naphæ	2

Lanolini pauxillum, fiat unguentum.

Pasta Calcis Chlorinatæ cum Pice.

	Pts.
Zinci oxidi	4
Olei cadini	4
Terræ silicæ	8
Calcis chlorinatæ	2
Aquæ distillatæ	20
Vaselini flavi	26

Solvantur et misceantur ut fiat pasta.

Lotio Plumbi cum Opio. T. C. Henderson. (*Chemist and Druggist*, December 21, 1889.) The author offers the following improved formula :—

Liq. Plumbi Subacet.	3j.
Glycerini	3j.
Tinct. Opii	5j.
Aquæ ad.	3xx.

Dilute the tincture of opium with 15 or 16 ounces of water. Mix the lead and glycerine together, add these, and finally make up to 20 ounces with water.

The result of this modification is a quite transparent lotion, which does not separate.

Caoutchouc Plasters. A. Schneegans and M. Corneille. (*Journ. der Pharm. f. Elsass-Lothringen*, February, March, and April, 1890. From *Pharm. Journ.*) The basis of the plasters adopted by the authors is a mixture of lanolin, benzoated tallow, caoutchouc and dammar resin, in variable proportions. The proportions of caoutchouc and dammar resin are kept as small as possible consistent with securing a good adherent mass; the lanolin and tallow preponderate, which excludes irritating action upon the skin. A slight addition of glycerine prevents the plaster from becoming dry and brittle under the action of the atmosphere.

The caoutchouc is incorporated in the form of a solution, which is made by macerating the flake indiarubber of commerce in five times its weight of benzol, with frequent agitation. The indiarubber swells up at first considerably, but dissolves entirely after

three or four days. The following are the formulæ adopted, and the manner of operating :—

Zinc Oxide Plaster (20 per cent.).

Dammar Resin	20 parts.
Benzoated Tallow	25 „
Lanolin	15 „
Caoutchouc	8 „
Glycerine	12 „
Zinc Oxide	20 „

The resin is melted over a bare fire; then the tallow is added, and the whole is strained through three or four thicknesses of gauze. With this mass, whilst still liquid, the lanolin and caoutchouc solution are incorporated, under continual agitation. A very homogeneous mass is thus obtained, which is heated, with the necessary precautions, over a water-bath, to eliminate the benzol. After complete evaporation of the benzine, which on the large scale can be recovered by distillation, the zinc oxide, previously made into a fine paste with the glycerine, is added. When the mass is uniform it is allowed to stand for a time while warm, to permit bubbles of air to escape, and it is then spread upon shirting. The mass should not be too warm when spread, or it may soak through the shirting; the thickness of the layer should be from that of a sheet of writing paper to that of a playing card. The plaster is dried in the air during two or three days, then covered with gauze, rolled, and wrapped in paper.

Mercury Plaster (20 per cent.).

Dammar Resin	25 parts.
Benzoated Tallow	12 „
White Wax	15 „
Lanolin	20 „
Caoutchouc	8 „
Metallic Mercury	20 „

The mercury is extinguished with the lanolin. The mixture, which is at first light grey, darkens during the trituration, and finally becomes blue-grey. The resin is melted with the tallow and wax, strained through gauze, the benzol solution of caoutchouc added, and the benzol driven off on a water-bath; to this warm mixture the mercurial lanolin is added, and the whole worked up together. It is then allowed to stand at a gentle heat for the escape of air bubbles, and the mass is spread when it has almost lost fluidity. The plasters are kept in tin boxes in a cool place.

Mercury and Zinc Plaster (20 : 10 per cent.).

Dammar Resin	20 parts.
Benzoated Tallow	12 „
White Wax	10 „
Caoutchouc	8 „
Lanolin	20 „
Mercury	20 „
Zinc Oxide	10 „

The mercury is extinguished with the lanolin, the zinc oxide rubbed in, and then added to the lukewarm mixture of the other constituents.

Iodoform Plaster (20 per cent.).

Dammar Resin	15 parts.
Benzoated Tallow	30 „
Lanolin	20 „
Caoutchouc	5 „
Glycerine	10 „
Iodoform	20 „

Prepared in the same way as the zinc plaster. The iodoform is triturated with the glycerine, and added to the mass, suitably cooled to avoid the volatilization of the iodoform. The plaster is preserved in tin cases.

Boracic Acid Plaster (20 per cent.).

Dammar Resin	20 parts.
Benzoated Tallow	25 „
White Wax	15 „
Caoutchouc	8 „
Lanolin	12 „
Boracic Acid	20 „

The resin, tallow, and wax are melted together, and the solution of caoutchouc added to the mixture while still liquid. After driving off the benzol on a water-bath, the boracic acid, rubbed up with the lanolin, is thoroughly incorporated with the mass.

The formula for *Salicylic Acid Plaster* corresponds to that for boracic acid plaster.

Ichthyol Plaster (20 per cent.).

Dammar Resin	20 parts.
Benzoated Tallow	20 „
White Wax	20 „
Caoutchouc	8 „
Lanolin	12 „
Ichthyol (Ichthyol-sodium)	20 „

The ichthyol is melted upon a water-bath with the lanolin, and incorporated with the liquid mixture of the other constituents.

Ointment for Eczema. (*Chemist and Druggist*, October 12, 1889.)

Dr. Mackintosh strongly recommends the following:—

Bismuthi Subnitrat	. . . . .	3iv.
Zinci Oxidi . . . . .	. . . . .	3j.
Acidi Carbolici Liquidi . . . . .	. . . . .	3ss.
Vaselini Albi . . . . .	. . . . .	3ij.
Ft. ung.		

Chloral for Dandruff. (*Amer. Journ. Pharm.*, March, 1890.)

The *Clinical Reporter* states that a solution of 5 grains of chloral in an ounce of water will clear the hair of dandruff and prevent its falling out from that cause.

Drops for Softening Wax in the Ear. (*Chemist and Druggist*, November 30, 1889.) The following solution is stated to facilitate the removal of wax:—

Acidi Borici	gr. lv.
Glycerini	f 3 jss.
Aquæ Dest.	f 3 jss.

Application for Burns. (*Nouveaux Remèdes*, August 24, 1889.)

Tannin and alcohol, of each 1 part; ether, 8 parts. Paint the burned portions two or three times daily, first washing with an antiseptic solution and sprinkling lightly with iodoform.

Prophylactic Mouth-Wash. Dr. Monte. (*Deutsche Med. Wochenschr.*, 1889.) Two formulæ are recommended by the author. Borated mouth-wash consists of boric acid, 2·5; distilled water, 250, and tincture of myrrh, 3 parts. The salicylated wash is made with sodium salicylate, 3; distilled water, 250, and tincture of myrrh, 3 parts.

Disinfectant Dentifrice. (*Répertoire de Pharm.*, October, 1889.)

Prota-Giurleo gives the following:—Alcohol of 40 per cent., 500; camphor, 10; salicylic acid, 20; benzoin, 50; clove stalks, 100; hypochlorite of lime, 50; essence of anis, 20; glycerin, 500. All of the substances except the hypochlorite and anis are placed in a strong, closed flask, which is subjected in a water-bath to 60° C. of heat for five hours, agitating occasionally. After macerating for eight days and filtering, the hypochlorite is added, when a further maceration of eight days is given, when the anis is added and the preparation is finally filtered. The liquid should be put up in small blue or yellow phials. This preparation perfumes the mouth, whitens the teeth, and frees the adherent tartar. It also

hardens the gums and arrests gingival hemorrhages. For a mouth-wash two teaspoonfuls are added to a quart of water.

Snuff for Colds. C. H. Stowell. (*Chemist and Druggist*, May 31, 1890.) The author recommends the following in place of solution of cocaine:—

Sodii Bicarb.	grs. ij.
Magnesiæ Carb. (levis)	„ iij.
Menthol	„ j.
Cocaine Hydrochlor.	„ iv.
Sacch. Lactis	3iss.

M. Sig.: Use as snuff.

Syrup of Coffee. E. Dieterich. (*Pharm. Centralhalle*, 1890, 160.) 200·0 parts of finely ground coffee are moistened with 250·0 parts of distilled water and 50·0 of spirit of cognac, and then 800·0 parts of boiling simple syrup added; the vessel is covered, set aside for fifteen minutes in a moderately warm place, and after standing at ordinary temperature for twenty-four hours, the liquid is filtered. This formula is stated to give a superior product, if the directions are followed closely.

Wine of Coca, Beef, and Iron. (*New Idea*, and *Chemist and Druggist*.)

Extract of Beef	256 grains.
Ammonio-citrate of Iron	64 „
Cocaine Muriate	8 „
Citric Acid	30 „
Sugar	2 ounces.
Alcohol	2 „
Spirit of Orange (1 in 8)	30 minims.
Ferric Hydrate	q.s.
Sherry Wine	q.s.
Water	q.s.

To make 16 ounces.

Dissolve the extract of beef in 1 oz. of hot water, add the alcohol containing the spirit of orange, and then ferric hydrate. Mix thoroughly, and then add 10 fl. ozs. of sherry wine. After standing several days, with frequent agitation, filter and pass enough water through the paper to make 13 fl. ozs. of filtrate. In a small portion of the filtrate dissolve the cocaine muriate and citric acid, and return it to the whole portion. Dissolve the iron in like manner, and to the whole add the sugar and dissolve by agitation without heat. Lastly, add water to make 16 ozs., and filter.

Ginger Wine. (*Chemist and Druggist*, August 31, 1889.) The following process for preparing this wine is recommended:—Boil,

in a perfectly clean copper, 6 gallons of water, 18 lbs. of loaf sugar, the thin rinds of 7 lemons and 2 Seville oranges, $\frac{1}{3}$ lb. of unbleached ginger, bruised, and a $\frac{1}{4}$ lb. of raisins. Boil for an hour, skim carefully, and pour off into a large vat until the next day. The preparation must not be left in the copper. Strain, add the juice of the lemons and oranges, 1 oz. of isinglass, and 2 tablespoonfuls of thick fresh yeast. Put the ginger wine into a cask, stir it each day until fermentation ceases, which will be in two or three days. Bung it up and leave it for six weeks. Strain it into another cask, and in four weeks it will be ready for bottling. The probable cost of this is estimated at about 1s. 2d. per gallon. The writer adds that the dried rinds of oranges and lemons answer quite as well as the fresh, and then tartaric or citric acid can be added in lieu of the juice. After boiling the syrup slowly, and skimming when any scum arises, a little tannin (about a drachm to 30 gallons) dissolved in a little water, may be added; this coagulates and throws down albuminous matter. Strain again into a tub prepared for the fermentation, and add yeast, about two large tablespoonfuls, or a $\frac{1}{4}$ pint to every 20 lbs. of sugar. Sometimes it is not advisable to add tannin until the fermentation is over, and fining begins. Straining before fermenting is always advisable, and the tub in which the fermentation takes place should be covered. When the fermentation has subsided, a solution of isinglass, or the whites of two or three eggs, may be introduced and stirred up, and the whole immediately racked off into another cask, which may be bunged down in the course of an hour or two, and when the wine will draw off bright it is ready for bottling.

Medicated Wines. E. Dieterich. (*Pharmaceut. Manual, and Chemist and Druggist.*)

Cascara Sagrada Wine.

White Gelatine, in strips . . .	15 grs.
Distilled Water	2½ drms.

Dissolve by the aid of heat, and add to—

Sherry Wine	28 ozs.
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Shake well, set aside for some time, then add—

Tasteless fluid extract of Cascara Sagrada	1½ oz.
Sugar	1½ „

Set aside in a cool place for eight days, and filter.

A similar wine, not free from the bitter principle of the bark, may be made by macerating $1\frac{1}{2}$ oz. of cascara sagrada and $1\frac{1}{2}$ oz. of sugar in 30 ozs. of sherry, for eight days, and filtering. A *Rhamnus frangula* wine can be made in the same way.

Cinchona Wine.

White Gelatine	.	.	.	.	.	15 grs.
Distilled Water	.	.	.	.	.	$2\frac{1}{2}$ drms.
Sherry Wine	.	.	.	.	.	18 ozs.

Detannate in the manner directed above; then add—

Simple Syrup	.	.	.	.	.	6 ozs.
Tincture of Cinchona	.	.	.	.	.	6 „

After eight days, filter.

May also be made with red wine, or direct from the bark, the quantities being:—

Gelatine	.	.	.	.	.	15 grs.
Distilled Water	.	.	.	.	.	$2\frac{1}{2}$ drms.
Sherry Wine	.	.	.	.	.	30 ozs.
Cinchona Bark, in coarse powder	.	.	.	.	.	10 drms.
Sugar	.	.	.	.	.	$1\frac{1}{2}$ oz.

Macerate for eight days, and filter.

In this case, care must be taken to have the gelatine and wine reaction complete before adding the cinchona, otherwise the alkalioid may be thrown out by the tannin of the wine.

Improved Quinine Wine.

Gelatine	15 grs.
Distilled Water	$2\frac{1}{4}$ drms.

Dissolve, and add to—

Sherry Wine	$29\frac{1}{2}$ ozs.
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Shake, and set aside to clear; then add the following solution:—

Hydrochlorate of Quinine	30 grs.
Dilute Hydrochloric Acid	.	.	.	.	.	30 drops.
Water	.	.	.	.	.	$\frac{1}{4}$ oz.

After a week filter.

Pepsin Wine.

White Gelatine, in strips	. . .	15 grs.
Distilled Water	. . . . .	2½ drms.
White Wine	. . . . .	25 ozs.

Detannate as described. At the same time mix together—

Pepsin	. . . . .	7 drms.
Glycerine	. . . . .	6 „
Distilled Water	. . . . .	6 „

Add to the wine along with 40 minims of hydrochloric acid; macerate for eight days, shaking occasionally; then filter.

Senna Wine.

Alexandrian Senna Leaves	. . .	1½ oz.
Sherry Wine	. . . . .	27 ozs.

Macerate for eight days, press and strain; then add 5 grains of gelatine dissolved in 2½ drachms of distilled water, and then the following:—

Tincture of Orange Peel	. . . . .	1 oz.
„ Ginger	. . . . .	½ „
Aromatic Tincture	. . . . .	80 mins.
Honey	. . . . .	2 ozs.

Again allow to stand for ten days, and filter.

This wine is an excellent aperient for persons suffering from hæmorrhoids. It should be taken in tablespoonfuls, according to the effect desired.

Essence of Vanilla. F. B. Quackenbush. (*Chemist and Druggist*, August 3, 1889.) The labour of powdering the vanilla is much lessened by the use of a small proportion of coarse sand, previously sifted and washed. The author believes that maceration brings out the flavour better than percolation, and that the longer the maceration proceeds, the more delicate will be the aroma of the tincture.

Mosquito Tincture. (From *Chemist and Druggist*.)

Eucalyptol	. . . . .	10 parts.
Acetic Ether	. . . . .	5 „
Eau de Cologne	. . . . .	40 „
Tincture of Insect Powder (1 to 5 S.V.R.)	. . . . .	50 „
Mix.		

For sponging the skin a mixture of one part of this with three

to six parts of water may be used. The tincture is also useful for spraying in apartments; for this purpose one part may be mixed with ten parts of water and used in a spray-producer.

Heliotrope Perfume. E. Campe. (*Chemist and Druggist*, March 15, 1890.)

Oil of Bergamot	1½ ounce.
Vanillin	8 grains.
Tincture of Benzoin	2 drachms.
Rectified Spirit	60 ounces.

Solve.

Hair Tonic. (*Chemist and Druggist*, August 17, 1889.) The following formula is said to promote a luxuriant growth of hair:—

Olive Oil	3ij.
Alcohol	3iiij.
Strong Salt Water	3iiij.
Spirit of Lavender	3j.

Mix.

To be rubbed into the scalp once daily.

Bismuth Hair Dye. (*Druggists' Bulletin and Chemist and Druggist*.) Prepare the following two solutions:—

No. 1.

Bismuth Subnitrate	200 grains.
Water	2 ounces.
Nitric Acid	420 grains, or q.s.

Use heat to effect solution.

No. 2.

Tartaric Acid	150 grains.
Sodium Bicarbonate	168 „
Water	32 ounces.

When effervescence of the latter has ceased, mix the cold liquids by pouring No. 1 into No. 2, with constant stirring. Allow the precipitate to subside, transfer it to a filter or a strainer, and wash with water until free from the sodium nitrate formed, as this salt would be an unnecessary impediment to the operation of the dye. Now allow the magma to drain until its weight is reduced to at least 4 ozs. This can be readily determined without removing it from the filter and funnel, if both have been previously weighed.

Eau de Cologne.

Oil of Lavender	5j.
„ Bergamot	5iv.
„ Lemon	5j.
„ Rosemary	5j.
„ Neroli	5j.
„ Cloves	gtt. 15.
„ Cedar	5ij.
„ Orange	5j.
Orange-flower Water	5j.
Rectified Spirit	Oij.

Boroglycerin-Cream. E. Dieterich. (*Pharm. Centralhalle*, 1890, 158.) 1·0 part of boric acid is dissolved with the aid of heat in 24·0 of glycerin, and allowed to cool. 5·0 parts of anhydrous lanolin, and 70·0 of paraffin ointment are melted together, coloured by addition of 0·01 parts of alkannin, the boroglycerin added, stirred to creamy consistence, and perfumed with one drop each of oils of rose and bergamot.

Honey and Almond Cream. G. H. Rose. (*Chemist and Druggist*, February 1, 1890.)

	Parts.
1. Ungt. Aq. Rosæ	5
2. Ol. Amygd. Dulc.	5
3. Glycerin	5
4. Ac. Boric	1
5. Liq. Sodæ, U.S.P.	12
6. Mucil. Cydon. (5ij-Oj.)	25
7. Aquæ ad	200

Heat 1, 2, and 5 together, stirring constantly till an emulsion is formed; then warm together 3, 4, 6, and about 150 parts of 7; after which mix with cold cream emulsion, stir till cold, and make up to 200 parts with 7. Perfume with almond and rose.

Cocoa Soap. (*Chemist and Druggist*, August 3, 1889.) Melt and purify by filtration 1,000 parts of cocoa butter; mix with it 850 parts of soda lye (sp. gr. 1·34), and place in a water bath; heat and stir until a portion removed from the vessel will completely dissolve in warm water. Add, with constant agitation, 250 parts of common salt, dissolved in 500 parts of water; continue the heat and stirring for half an hour, and then pour into moulds and cool. When cold, remove the soap, which floats on the top, and press out in a cloth. The product should be treated a second time with the solution of salt, and finally washed with water.

Petroleum Soap. M. Emery. (*Répertoire de Pharm.*, 1890, 205.)

The author prepares this soap for medicinal purposes by heating together 50 parts of petroleum, 40 parts of white wax, and 50 parts of 90 per cent. alcohol until solution is complete, then adding 100 parts of Marseilles soap, and when this is dissolved agitating until the mixture assumes a creamy consistence, when it is run into moulds. The soap so obtained is described as being homogeneous and firm, emulsifying well, especially with hot water, and as being an excellent medium for applying the insecticidal properties of petroleum to the skin.

Disinfecting Candles. (*Chemist and Druggist*, October 26, 1889.)

	Parts.
Wax	50
Sulphur	20
Saltpetre	10
Charcoal	10
Flour Paste	10

Mix.

Copal Varnish. (*Pharmaceut. Zeitung*, and *Chemist and*

Druggist.) The following is said to make a good preparation :—

	Parts.
Manilla Copal	4
Linseed Oil	3
Turpentine	a sufficiency.

Melt the copal over the fire, then stir in the oil, mix, remove from the fire, and when the mixture has cooled down to 100° add enough turpentine to make 10 parts.

Label Varnish. (*Chemist and Druggist*, from *Archiv der Pharm.*)

	Parts.
Sandarac	53
Mastic	22
Camphor	1
Lavender Oil	8
Venice Turpentine	4
Ether	6
Alcohol	40

All by weight.

Macerate the ingredients for several weeks until fully dissolved. The result is a limpid, colourless, brilliant varnish, which dries quickly and is not too brittle.

Paste for Labels. (*Chemist and Druggist*, September 28, 1889.) Patton recommends the following formula :—

Wheat Flour	.	.	.	.	.	.	1 lb.
Alum	.	.	.	.	.	.	3ij.
Borax	.	.	.	.	.	.	5ij.
Hydrochloric Acid	.	.	.	.	.	.	3iss.
Water	.	.	.	.	.	.	3xvj.

Mix the flour, alum, and borax, and stir to a smooth paste with the water; then add the acid, and heat until the starch-cells break, stirring constantly.

This makes a very thick paste, which must be thinned with water as wanted for use. A small quantity of essence of winter-green poured over the paste in stock will preserve it indefinitely.

Gold Lacquer for Tin. (*Chemist and Druggist*, April 5, 1890.) Make a solution of shellac, 1 part in 4 parts of spirit, and allow to stand until clear, or filter to get rid of the fatty matter. Add an alcoholic solution of picric acid until the desired colour is obtained, then 1 per cent. of boric acid.

Liquid Glue. M. Hesz. (*Chemist and Druggist*, August 10, 1889.) Liquid glue, possessing great resisting power, and particularly recommended for wood and iron, is prepared, according to the author, as follows:—Clear gelatine, 100 parts; cabinet-makers' glue, 100 parts; alcohol, 25 parts; alum, 2 parts; the whole mixed with 200 parts of 20 per cent. acetic acid, and heated on a water-bath for six hours. An ordinary liquid glue, also well adapted for wood and iron, is made by boiling together for several hours 100 parts glue, 260 parts water, and 16 parts of nitric acid.

Ink for Type-Writing. E. B. Shuttleworth. (*Canadian Pharm. Journ.*, January, 1890, 81. From *Pharm. Journ.*) In experimenting upon a compound suitable for use as ink for a type-writing machine, the author made the observation that many of the salts of the aniline series are soluble in castor-oil. Methyl violet is especially so, and advantage can be taken of this fact to prepare an ink of remarkable power, admitting of a large number of copies being taken from the same impression. Nigrosine was not experimented with, but it would seem possible that with it a black ink of some intensity might be produced. The incorporation and solution of the aniline in the oil can be effected on the small scale by triturating the previously powdered pigment with the oil in a mortar, the operation being sometimes facilitated by the addition of a little alcohol. Various coloured inks for stamping pads might be produced in the same way, though it has not yet

been determined whether such mixtures would exercise a deleterious influence on the rubber stamp.

Copying Ink. (*Chemist and Druggist*, July 26, 1890.) The following formulæ are for inks which provide copies without a press, but they can be used also as ordinary writing-inks:—

	Parts.
Extract of Logwood	200
Sulphate of Iron	8
Chromate of Potash	2
Indigo Carmine	16
Gum Arabic	2
Glycerine	20
Salicylic Acid	0.3
Vinegar	100
Distilled Water.	900

Dissolve the extract of logwood completely in a portion of the water by heating at a temperature of about 200° F. Then add the rest of the water and the vinegar, in which the other ingredients have been mixed in the order given above and dissolved. Mix thoroughly, and set aside for a few days to settle. Another formula, which provides an ink of different colour, but equally satisfactory, is as follows:—

	Parts.
Water	1,000
Extract of Logwood	200
Indigo Carmine	20
Alum	25
Sulphate of Iron	4
Sulphate of Copper	3
Glucose	16
Gum Arabic	2
Chromate of Potash.	2
Salicylic Acid	0.3

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TRANSACTIONS
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CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following :—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The subscription shall be 7s. 6d. annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

*. Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

FORM OF NOMINATION.

I Nominate

(Name).....

(Address).....

as a Member of the British Pharmaceutical Conference.

.....Member.

Date.....

This or any similar form must be filled up legibly, and forwarded to The Asst. Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

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Mr. A. Strachan, 139, Rosemount Place, Aberdeen.

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OF THE

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AT THE

TWENTY-SEVENTH ANNUAL MEETING, LEEDS, 1890.

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Other Members of the Executive Committee.

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DOTT, D. B., F.R.S.E., Edinburgh.
GERRARD, A. W., F.C.S., London.
GEEN, PROF., M.A., B.Sc., London.

HOLMES, E. M., F.L.S., London.
KIRKBY, W., F.R.M.S., Manchester.
MARTIN, N. H., F.L.S., Newcastle-on-Tyne.
TAYLOR, S., Leeds.

Auditors.

T. RHEEDER, Newcastle-on-Tyne.

E. YEWDALL, Leeds.

Assistant Secretary.

J. C. NIGHTINGALE.

Editor of Year-Book.

LOUIS SIEBOLD, F.I.C., F.C.S.

Local Committee.

ARCHER, J. S., Guiseley, Leeds.
BARRACLOUGH, T., Leeds.
BAYLEY, G. H., Saltaire.
BEACOCK, J. F., Leeds.
BOOTH, J., Heckmondwike.
BOWMAN, W., Leeds.
BOTHAMLEY, C. H., F.I.C., F.C.S.
BRANSON, F. W., F.I.C., F.C.S.,
Secretary, Leeds.
BRATLEY, W., Pontefract.
BRIGGS, G., Leeds.
BROOK, ROBERT, Halifax.
BROWN, E., Leeds.
BUCKLE, JAMES, Malton.
CATERALL, C. G., Leeds.
CHAPLIN, J. L., Wakefield.
CLARK, JOHN, York.
CROOK, C., East Thorpe, Miffield.
CUSONS, T. T., Ossett, R.S.O.
CUTHBERT, R., Huddersfield (West-
gate).

DAVIS, R. HAYTON, F.C.S., Harrogate.
DAY, J., Leeds.
EXLEY, J., Leeds.
FAIRLEY, THOMAS, F.I.C., F.R.S.E.,
Leeds.
FLETCHER, T., Leeds.
FOSTER, A., Dewsbury.
FOURNNESS, R., Leeds.
HARRISON, W., Headingley, Leeds.
HIRST, BENJAMIN, Leeds.
HIRST, J. A., Leeds.
HORSFIELD, J. N., Leeds.
JACKSON, JAMES, Wetherby.
JEFFERSON, P., Leeds.
KERSHAW, A. N., Kelighley.
KING, W., Huddersfield.
LEWKOWITZ, J., Ph.D., F.I.C., Leeds.
MAUD, W. R., Pontefract.
MAUDSON, R. T., Leeds.
POCKINGTON, H., F.R.M.S., Leeds.
POLITT, W. D., Leeds.

POWELL, WILLIAM, Leeds.
PRATT, R. M., Otley.
REYNOLDS, RICHARD, F.I.C., F.C.S.,
Leeds.
REYNOLDS, R. F., Leeds.
RIMMINGTON, GEORGE, Bradford.
SAVILLE, W., Leeds.
SHEPHERD, J. W., Settle.
STUBBINS, J., F.G.S., F.R.M.S., Head-
ingley, Leeds.
TAYLOR, BENJAMIN, Leeds.
TAYLOR, S., Treasurer, Leeds.
THOMPSON, G., Knaresbro'.
TURTON, WILLIAM, Leeds.
WAPD, GEORGE, F.C.S., Chairman,
Leeds.
WEST, WILLIAM, Bradford.
WILSON, J. F., Harrogate.
WORFOLK, G. W., Ilkley.
YEWDALL, E., Leeds.

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE
LECTURE THEATRE OF THE PHILOSOPHICAL HALL, LEEDS,
ON TUESDAY & WEDNESDAY, SEPTEMBER 2ND AND 3RD, 1890,
Commencing at Ten a.m. each day.

MONDAY, 1st SEPTEMBER.

The EXECUTIVE COMMITTEE met, according to notices from the Honorary General Secretaries, at 10 p.m., at the Philosophical Hall, Leeds.

TUESDAY, 2nd SEPTEMBER.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 4 p.m.

Order of Business.

Reception of Delegates.
 Report of Executive Committee.
 Financial Statement.
 Report of Treasurer of the "Bell and Hills Library Fund."
 President's Address.
 Reading of Papers and Discussions thereon.

PAPERS.

1. *Report of Unofficial Formulary Committee.* By W. MARTINDALE, F.C.S.
2. *The Alkaloidal Values of Annual and Biennial Henbanes.* By A. W. GERRARD, F.C.S.
3. *Alkaline Sulphites.* By C. H. BOTHAMLEY, F.I.C., F.C.S.
4. *Note on Strophanthus Hispidus.* By E. M. HOLMES, F.L.S.
5. *Note on Ouabin.* By T. CHRISTY, F.L.S.
6. *The Estimation of Nitrites in Drinking Water.* By J. C. THRESH, M.B., D.Sc.
7. *Report on Three Years' Experience of Chloroform Water as a Preservative.*
 By J. F. BURNETT, F.C.S.
8. *Chloroform and Chloroform Water as Preservatives.* By HAROLD WYATT, JUN.
9. *On Glycerine.* By J. LEWKOWITSCH, Ph.D., F.I.C., F.C.S.
10. *Purification of Glycerine.* By LOUIS SIEBOLD, F.I.C., F.C.S.
11. *Antidotes to Strychnine.* By LOUIS SIEBOLD, F.I.C., F.C.S.
12. *Note on a Compound of Caffeine with Mercuric Chloride.* By R. H. DAVIES,
 F.I.C., F.C.S.
13. *A Comparative Examination of the Tests for Methylated Spirits.* By E. J.
 MILLARD and A. C. STARK.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Albert Hall.

At 5 p.m. members and their friends visited the Yorkshire College, where they were received by Principal Bodington and other representatives of the College, after which afternoon tea was provided.

WEDNESDAY, 3rd SEPTEMBER.

The CONFERENCE met at 10 a.m., adjourning from 1 p.m. till 2 p.m. The whole of the business of the Conference was completed this day by about 4 p.m.

Order of Business.

Reception of Delegates.

Reading of Papers and Discussions thereon.

PAPERS.

14. *Oroxylum Indicum*. By E. M. HOLMES, F.L.S.
15. *Chemical Examination of the Bark of Oroxylum Indicum*. By W. A. H. NAYLOR, F.I.C., F.C.S., and E. M. CHAPLIN, F.C.S.
16. *Hydrargyri Iodidum Viride*. By W. MARTINDALE, F.C.S., and W. A. SALTER.
17. *On Cream of Tartar*. By H. BROADBENT, A.I.C., F.C.S.
18. *The Constitution of Synthetic Remedies explained from a Chemical point of view, showing the relationship one to another*. By J. HODGKIN, F.I.C., F.C.S.
19. *Some Points in the Analysis of Oils*. By T. FAIRLEY, F.R.S.E., and B. A. BURRELL, F.I.C., F.C.S.
20. *Note on Analysis of Bile*. By T. FAIRLEY, F.R.S.E.
21. *Note on a Sample of Adulterated Saffron*. By W. KIRKBY, F.L.S.
22. *The Solvent Action of Alcohol of different strengths upon some of the Drugs used in making Pharmacopœial Tinctures*. By R. WRIGHT.
23. *Notes on some Alkaloidal Tinctures*. By E. H. FAER.
24. *Laboratory Notes on Extract of Malt, Semi-solid and Liquid*. By J. C. UMNEY.
25. *Extract of Malt*. By D. B. DOTT, F.R.S.E.
26. *Note on the Comparative Medicinal Values of the three Official Buchus*. By C. J. S. THOMPSON.
27. *Note on Syrup of Hypophosphite of Iron, B.P.C.* By J. MACINTYRE.
28. *Chemical Notes on Mannas*. By D. HOOPER, F.C.S.
29. *On the Uses of Curry Leaves*. By Dr. P. S. MOOTOOSWAMY, F.L.S.

Presentation from Bell and Hills Fund.

Election of Formulary Committee.

Place of Meeting for 1891.

Election of Officers for 1890-91.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Albert Hall.

At 4.15 p.m. members and their friends drove to Roundhay Park, where afternoon tea was served in the mansion at 5 p.m.

THURSDAY, 4th SEPTEMBER.

At 9.45 a.m. a special saloon train conveyed the party from the Midland Station to Embsay; from there to Barden, by way of Embsay Moor, the journey was made by carriages. The party then walked through Bolton Woods to the Strid, and much enjoyed the lovely scenery of this portion of Wharfedale.

At 1 p.m. luncheon was served in the Devonshire Arms Hotel, Bolton, after which the Abbey Ruins were visited. The journey was then resumed to Ilkley, where afternoon tea was served in the Winter Gardens of the Wells House Hydropathic Establishment. The return to Leeds was made by special train leaving Ilkley at 6.25, and arriving at its destination at 7 p.m.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT LEEDS, 1890.

THE Twenty-seventh Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, September 2nd, in the Lecture Theatre of the Philosophical Hall, Leeds, Chas. Umney, Esq., F.I.C., F.C.S., in the chair.

The following members and visitors were present during the meeting :—

- Aberdeen*—Johnson, J. ; Kay, J. P.
Bedlington—Foggan, G.
Birmingham—Barclay, J. ; Cripps, R.
Bolton—Forbes, J. W.
Bonnyriggs—Hutcheon, W.
Bradford—West, W.
Brighton—Leigh, Marshall ; Savage, W. G.
Bristol—Berry, W.
Buxton—Wright, R.
Cardiff—Coleman, A. ; Munday, J. ; Zorath, T. C.
Chelmsford—Thresh, Dr. J. C. ; Thresh, Mrs.
Chester—Baxter, G.
Clifton—Schacht, G. F. ; Towerzey, A. A.
Coventry—Morris, J.
Dewsbury—Ward, S.
Doncaster—Hasselby, T. J. ; Kirk, J. M. ; Stiles, H. M.
Dover—Bottle, A.
Dublin—Beggs, G. D. ; Brown, Miss ; Wells, W. F. ; Wells, Mrs. W. F.
Edinburgh—Macadam, S.
Farnworth—Watkinson, J. W.
Glasgow—Frazer, D. ; Kinninmont, A.
Grantham—Whysall, W.
Halifax—Dyer, W. B.

Hanley—Broadbent, J. B.

Guiseley—Archer, J. S. ; Archer, W.

Harrow—Harrison, Miss L. A.

Hartlepool—Morris, W. E.

Hexham—Riddell, R.

Hitchin—Ransom, F.

Huddersfield—Stephens, S.

Hull—Bell, B. C.

Ilkley—Worfolk, G. W.

Keighley—Kershaw, A. W.

Knaresborough—Thompson, G.

Leeds—Boyce, F. ; Bothamley, C. H. ; Bowman, W. P. ; Broadbent, H. ; Branson, F. W. ; Cole, E. H. ; Fairley, T. ; Hardman, J. W. ; Jefferson, P. ; Maudson, R. T. ; Murphy, A. J. ; Pollitt, W. B. ; Reynolds, R. ; Ward, G. ; Westmoreland, J. W. ; Yewdall, E.

Leicester—Butler, E. H. ; Clark, J. W.

Leighton Buzzard.—Richmond, R.

Liverpool—Abraham, A. C. ; Bain, J. ; Conroy, M. ; Hudson, T. H. ; Lee, S. W. ; Parkinson, R. ; Symes, C. ; Wellings, W.

London—Allen, C. B. ; Bird, F. C. J. ; Bishop, G. T. ; Burroughs, S. M. ; Bremridge, R. ; Clarke, J. G. ; Collier, H. ; Crawshaw, E. ; Davies, R. H. ; Davies, Mrs. R. H. ; Dyson, H. B. ; Gerrard, A. W. ; Glazier, W. ; Green, Prof. J. R. ; Hall, H. E. ; Hodgkin, J. ; Holdin, J. ; Hopkin, W. K. ; Knott, S. M. B. ; Long, H. ; MacEwan, S. ; Maitland, P. L. ; Martindale, Wm. ; Martindale, Mrs. Wm. ; Mason, A. H. ; Mathews, J. H. ; Miles, C. J. ; Naylor, W. A. H. ; Nightingale, J. C. ; Pettinger, E. ; Passmore, F. ; Potter, H. ; Sangster, A. ; Strother, C. J. ; Taylor, G. S. ; Taylor, S. ; Thompson, M. : Tingle, J. G. ; Tompsett, L. S. ; Umney, Chas. ; Umney, J. C. ; Williams, T. H. ; Wink, J. A. ; Wright, T. R. ; Wootton, A. C.

Louth—Simpson, H. D.

Manchester—Benger, F. B. ; Balmforth, A. ; Jackson, Dr. N. A. ; Kirkby, W. ; Siebold, L.

Newcastle-on-Tyne—Clauge, T. Maltby ; Martin, N. H.

Newport, Mon.—Garrett, T. P.

New York—Evans, W. J.

Norwich—Corder, O.

Nottingham—Patchett, E. C.

Ripon—King, L. ; King, Leavens ; Parkin, J. B. ; Parkin, Mrs. J. B.

Salisbury—Atkins, S. R.
Saltaire—Bayley, G. H.
Settle—Shepherd, J. W.
Sheffield—Allen, A. H. ; Morrison, C. O. ; Newsholme, G. T. W. ;
Rupertson, A. ; Watts, R.
Shrewsbury—Cross, W. G.
Sunderland—Ranken, C.
Swansea—Grose, H. M. ; Hughes, J.
Wakefield—Chaplin, J. L. ; Chaplin, J. H.
Weymouth—Groves, T. B.
Wigan—Johnson, T.
Woolwich—Gwinnell, E.
York—Clark, J.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Philosophical Hall, Leeds, on Monday, September 1, 1890, at 10 p.m.

Present :—Mr. Umney (President), in the chair, Professor Green, Messrs. Atkins, Bengier, Branson, Conroy, Davies, Gerrard, Groves, Kinninmont, Martin, Reynolds, Schacht & Ward, Mr. Martindale (Hon. Treasurer), Messrs. Naylor and Ransom (Hon. Gen. Secs.), and Mr. J. C. Nightingale (Assistant Sec.).

The minutes of the previous meeting were read and confirmed.

A draft report for presentation at the annual meeting was submitted by the Hon. General Secretaries, and after a slight verbal alteration was agreed to.

The Treasurer's financial statement for the year 1889-90 was read and approved.

Copies of a draft programme of the business of the general meeting were placed before the members. The programme was discussed, amended, and finally arranged.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election.

Mr. Martindale presented a report of the Formulary Committee, in which attention was called to the fact that the whole of the original grant of £25 had been expended. The report was accepted, and it was agreed to recommend to the general meeting the reappointment of the Committee. A further grant of £10 was made for current expenses.

The place of meeting for 1891 was considered. Mr. Naylor read a letter from Mr. Alfred Coleman, of Cardiff, conveying on

behalf of a committee of pharmacists of that town a cordial invitation to the Conference to hold its next session there. It was resolved to recommend the invitation to the general meeting for acceptance.

A conversation ensued touching the advisability of the Conference continuing to hold its annual meeting at the same place and about the same time as the British Association. After a free expression of opinion on the matter, it was decided to consult the views of the members generally. The President was therefore authorized to ventilate the subject in open meeting and request the members to give their thoughtful consideration to it during the current year.

A letter was read from the Assistant Secretary tendering his resignation of the office which he has held for the past three years. Mr. Naylor expressed personal regret at losing the services of Mr. Nightingale, and desired to refer especially to the wholeheartedness, thoroughness, and neatness which had characterized his discharge of the duties of his post. These sentiments were unanimously endorsed, and Mr. Nightingale was thanked for his work in connection with the Conference. At the same time the hope was expressed that the relative affliction which called for his resignation might speedily be removed.

The following twenty-eight gentlemen were duly nominated and elected to membership.

Bothamley, Mr. C. H., Leeds.	Murphy, Mr. A. J., Leeds.
Bowman, Mr. W. P., Leeds.	Parkes, Surgeon Major, M.D., Bombay.
Broadbent, Mr. H., Leeds.	Riddiough, Mr. F., Keighley.
Chaplin, Mr. J. H., Wakefield.	Saltmer, Mr. Jas., Hull.
Cooper, Mr. A., F.C.S., Newlay.	Seeley, Mr. H. W., Halifax.
Cranidge, Mr. S. W., Doncaster.	Strother, Mr. C. J., London.
Crisford, Mr. F. J., St. Leonards.	Swinbank, Mr. John, Bedale.
Cunningham, Mr. A. A., San Francisco, U.S.A.	Tremble, Mr. J. E., Montreal.
Fryer, Mr. C. H., London.	Watts, Mr. Robt., Sheffield.
Hardman, Mr. J. W., Leeds.	Whooley, Mr. E. J., Manchester.
Holding, Mr. John, London.	Williams, Mr. W. J., Cardiff.
Jackson, Mr. H. F., Montreal.	Williams, Mr. W. Ll., A.I.C., London.
Kershaw, Mr. A. N., Keighley.	Wood, Mr. J., Barnsley.
Maudson, Mr. R. T., Leeds.	
Morrison, Mr. Jos. E., Quebec.	

GENERAL MEETING.

Tuesday, September 2nd.

The Conference assembled for its twenty-seventh annual meeting in the Lecture Theatre of the Philosophical Hall, Leeds, on Tuesday morning, September 2nd. Charles Umney, Esq., F.I.C., F.C.S., President, in the chair.

Mr. R. REYNOLDS, Leeds, opened the proceedings by offering, on behalf of the Local Committee, a hearty Yorkshire welcome to the Conference. He referred to his own connection with the Conference from its birth, if not before, but said he would refrain from indulging in the garrulous utterances for which nurses were celebrated, and would not therefore comment as he might on many incidents of the Society's childhood. He would only say that it had been planted on a solid foundation, and if they in the present could hand down to the future what they had received from the past, they would be only fulfilling their duty. There was no doubt that the visits which had been paid to various parts of the country had assisted to broaden the minds of the members, and he hoped the same result would attend the present meeting.

RECEPTION OF DELEGATES.

Mr. F. RANSOM (Honorary Secretary), then read the following list of delegates who had been appointed by different Societies to attend the Conference:—

Pharmaceutical Society of Great Britain:—The President, Vice-President, Treasurer, Messrs. Abraham, Allen, Atkins, Cross, Leigh, Martin, Martindale, Newsholme and Schacht, and the Editor, Sub-Editor, and Secretary.

Pharmaceutical Society of Great Britain (North British Branch):—Messrs. D. Frazer, A. Kinninmont, and J. Paterson.

Pharmaceutical Society of Ireland:—Messrs. G. D. Beggs and F. W. Wells, jun.

Aberdeen and North of Scotland Society of Chemists and Druggists:—Messrs. J. Johnson and J. S. Kay.

Brighton Association of Pharmacy:—Messrs. Marshall Leigh and W. D. Savage.

Bristol Pharmaceutical Association:—Messrs. Schacht and Towerzey.

Dover Chemists' Association:—Messrs. Alex. Bottle and W. Wyles.

Hawick Pharmaceutical Association:—Mr. T. Maben.

Hull Chemists' Association:—Messrs. C. B. Bell, J. S. Linford and B. M. Stoakes.

Leeds Chemists' Association:—Messrs. F. W. Branson, J. Jefferson, R. Reynolds, S. Taylor, Geo. Ward and E. Yewdall.

Leicester and Leicestershire Chemists' Association:—Messrs. J. W. Clark and J. G. F. Richardson.

Liverpool Chemists' Association:—Messrs. John Bain, M. Conroy, R. Parkinson, C. Symes, and W. Wellings.

London Chemists' Assistants' Association:—Messrs. T. A. Ellwood, C. W. Seccombe, A. C. Stark, C. J. Strother, and W. Lloyd Williams.

Manchester Pharmaceutical Association:—Messrs. Bengier, Siebold, and Kirkby.

Midland Counties Chemists' Association:—Messrs. J. Barclay and R. A. Cripps.

Newcastle-on-Tyne North of England Pharmaceutical Association:—Messrs. T. Maltby Clague, P. Hall, J. Harrison, N. H. Martin, and E. C. Stuart.

Sheffield Pharmaceutical and Chemical Society:—Messrs. J. H. Eardley, A. Russell Fox, C. O. Morrison, G. T. W. Newsholme, W. Ward, and R. Watts.

West London Chemical Association:—Messrs. Long and Matthews.

The PRESIDENT said letters of apology for their absence had been received from Professor Attfield, Professor Bentley, Mr. Brady, Mr. Clayton, Mr. Hampson, Mr. Holmes, Mr. Maben, and Mr. Wiley.

Mr. W. A. H. NAYLOR (Hon. Gen. Sec.) next read the Report of the Executive Committee, as follows:—

REPORT OF THE EXECUTIVE COMMITTEE.

Your Committee, in presenting its annual report for the year, is glad to be able to announce that the Conference maintains its prestige, and is in a satisfactory and prosperous condition.

At a meeting held in November last, your Committee received with deep regret the resignation of J. C. Thresh, M.B., D.Sc., of the office of Honorary General Secretary of the Conference, consequent upon his appointment as Medical Officer of Health for the Chelmsford and Maldon rural sanitary district. On behalf of the Conference your committee placed on record its sense of the effi-

cient services rendered by Dr. Thresh during the five years that he held office. The assistance rendered by him not only in his official capacity, but as the author of a number of valuable papers which he has read at its meetings, has materially contributed to the success of past annual gatherings, and it is hoped that his professional duties will not prevent him from making communications in the future. At the following meeting Mr. F. Ransom, F.C.S., was appointed to fill the vacancy caused by the resignation of Dr. Thresh.

Early in the present year, on the recommendation of the Formulary Committee, sanctioned by the Executive of the Conference, an addendum to the 1888 Formulary was issued. This included preparation the increasing demand for which appeared to justify the publication of directions for their manufacture, so as to secure efficient and uniform products.

At a meeting held in April, your Committee received with painful surprise the sad intelligence of the death of Mr. Wm. Smeeton, of Leeds, a Vice-President of the Conference. Mr. Smeeton had for many years taken a deep interest in all that concerned pharmacy, and his election to office at the last annual meeting of the Conference indicated the esteem in which he was held by this Association. Mr. G. Ward, F.I.C., F.C.S., one of the auditors, was elected to fill the vacancy, and his name has been added to the list of Vice-Presidents. At the same time Mr. Yewdall, of Leeds, generously accepted an invitation to succeed to the office previously held by Mr. Ward.

In accordance with a resolution mentioned in the report of last year, a revised circular drawing attention to the objects of the Conference and inviting to membership has been freely distributed through the secretaries of local associations to which the "Year-Book" is annually sent. Sufficient time has not yet elapsed to judge of the effect of this distribution, but it is hoped that it will result in a large accession of numerical strength.

It has been resolved to send a special invitation to membership to all chemists and druggists, as they shall be placed on the Register of the Pharmaceutical Society of Great Britain. Practical effect is given to this resolution as necessity arises. It is believed, however, that more may be done in obtaining new adhesions by the personal efforts of individual members than by formal appeals made through your secretaries. Copies of circulars will be gladly supplied to any members who are willing to distribute them among their pharmaceutical friends. It is gratifying to your

Committee to be able to announce the application of a money grant to defray expenses in connection with a research. The amount of five pounds was handed over in December to Mr. R. A. Cripps to assist him in continuing his investigation on ipecacuanha. Mr. Cripps regrets that his work is not in a sufficiently advanced stage to justify a presentation to this meeting of the results he has obtained.

It is a subject of special interest to note the appointment by the Pharmaceutical Society, at the instance of the Medical Council, of a Committee of pharmacists, for the purpose of assisting the Pharmacopœia Committee of the Medical Council in the preparation of an Addendum to the British Pharmacopœia. The fact that pharmacists are now represented on the Committee of Compilation may justly be regarded as a matter for congratulation. There still remain, however, and doubtless will continue to be, many preparations in frequent demand which, although not of sufficient importance for official recognition, will require the careful attention of your Formulary Committee.

The Reception held last night by the President and Officers of the Conference, and the *Conversazione* which followed, were largely attended and proved a signal success.

In December last Mr. Louis Siebold, F.I.C., F.C.S., was re-appointed Editor of the *Year-Book*. The MS. of the forthcoming volume, so far as it can be completed, is now in the hands of the printers.

Mr. MARTINDALE (Hon. Treasurer) read the financial statement, and added that he thought the account was a very satisfactory one, the balance of assets in hand being about £15 more than on the last year's account. Only one grant has been made for experimental research, and he hoped that in future the funds would be more largely utilized by members in this direction.

Mr. YEWDALL (Leeds), one of the auditors, said he had examined the vouchers and securities and found everything in order.

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1890.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1889.	DR.	£	s.	d.
July 1.	To Assets forward from last year :—			
"	" Balance in hand at Bank	64	17	3
"	" Cash in Secretary's hands	3	11	7
"	" Messrs. Churchill's Account	117	8	9
1890.				
June 30.	" Sale of Year-Book by Publishers	18	0	0
"	" Advertisements, 1889 vol. . £109 11 8			
"	" " 1888 vol. . . 7 17 0			
		117	8	8
"	" Members' Subscriptions, Amount received for year ending July 1, 1889, to June 30, 1890	527	1	1
"	" Index to Year-Book, sale by Secretary	0	5	0
"	" Unofficial Formulary, sale by Publisher	9	9	0
"	" Outstanding Liabilities, Messrs. McCorquodale & Co.	0	8	6
		£858	9	10
1890.	CR.	£	s.	d.
June 30.	By Expenses connected with Year-Book :—			
	Printing, Binding, Publishing, etc.	£296	12	6
	Postages and Distribution	39	11	7
	Advertising and Publisher's charges	32	14	2
	Editor's Salary	150	0	0
	Foreign Journals for Editor	5	16	6
		524	14	9
"	Unofficial Formulary :—			
	Advertising and Postage	4	1	6
	Publishers' Commission	0	19	0
		5	0	6
"	Sundry Expenses :—			
	Grant to Formulary Committee	5	0	0
	Expenses of Assist. Sec. at Newcastle	10	0	0
		15	0	0

1890.	CR.	£	s	d.
June 30.	By Assist. Sec.'s Salary from July 1, 1889, to June 30, 1890	47	10	0
„	„ Rent of Office	10	0	0
		<hr/>		
„	„ Grant (for Research)		57	10 0
„	„ Blue Lists, Printing	3	10	0
	Postages of	3	1	3
	Revising and Editing	5	5	0
		<hr/>		
„	„ Postages		11	16 3
„	„ Printing and Stationery, from July 1, 1889, to June 30, 1890		13	1 6
„	„ Bank Charges, as per Bank Book		19	15 6
„	„ Petty Cash		0	1 1
„	„ Liabilities of last year, since paid:—		5	11 0
	Messrs. McCorquodale & Co.		6	17 9
„	„ Outstanding Assets—Messrs. Churchill's Account		107	3 0
„	„ Balance at Bank	83	0	8
„	„ Balance in Secretary's hands	*3	17	10
		<hr/>		
			86	18 6
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* For Postages, 2s. 1d.; Petty Cash, £3 15s. 9d.

The Bell and Hills Fund.

1889.		£	s.	d.	£	s.	d.
July 1.	Balance in hand	17	9	2			
„ 19.	Dividend on Consols, due July 6, 1889	2	8	4			
Dec. 17.	„ „ „ Oct. 6, 1889	2	8	4			
1890.		<hr/>					
Jan. 10.	„ „ „ Jan. 6, 1890	2	8	4			
May 14.	„ „ „ April 6, 1890	2	8	4			
1889.		<hr/>			27	2	6
Sept. 20.	By Purchase of Books from Kimpton for Newcastle		9	18	0		
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	Balance		17	4	6		
	Assets { Cash—Balance at Bank		17	4	6		
	{ Consols		360	0	0		

Audited and found correct. Security (Consols, £360) viewed.

T. RHEEDER, Newcastle-on-Tyne. } *Auditors.*
EDWIN YEW DALL, Leeds.

The PRESIDENT then delivered the following address :—

THE PRESIDENT'S ADDRESS.

Ladies and Gentlemen,—When at the last meeting at Newcastle you decided to place me for a second time in the presidential chair, I appreciated the compliment, and looked forward with much pleasure to the opportunity of presiding at this annual meeting amongst so many well-known and staunch supporters of the British Pharmaceutical Conference as are to be found in Leeds and the West Riding of Yorkshire.

As this Association becomes older it is less easy to find a suitable theme for the "President's Address," inasmuch as restrictions multiply, and notwithstanding there is much in which we are necessarily interested arising out of pharmaceutical politics, still there is an unwritten, and in my opinion a wise understanding, that such subjects shall be eschewed in the annual address from this chair.

Some of your past presidents framed their addresses upon the scientific progress of the preceding year, and the material was ample, and the retrospect both agreeable and instructive; but the enlarged area one would now have to traverse to produce a complete summary, seems to be a sufficient reason for treating such a review in the preface of the "Year-Book of Pharmacy."

The time apportioned by your Executive for reading the communications that you and others are pleased year by year to bring before the Conference is much too short, consequently discussion is curtailed, and your secretaries are frequently compelled to abstract communications, which had time permitted might have been more fully read and discussed.

My intention is to give you a short address, so that our time may be profitably utilized, and I beg, therefore, you will, during this Conference, punctually attend each and every sitting, so that you may by your presence encourage those who have communications to make, and show your appreciation of pharmacological research.

We hear it remarked that there is a fashion in everything, and those who do not so express themselves are at times conscious of the difficulty in finding nowadays anything uninfluenced by fashion.

It cannot be contended that medicine, striving year by year to become a less inexact science, knows no fashion, although it might

be urged that there was in medicine a licence for adopting fashions without parallel in any other profession or calling, solely due to the rapid strides of science.

The advance in medicine and surgery of late years is a matter of common knowledge and observation, and a glance at a list of modern medicaments shows that there is a material change in the substances prescribed in the present as compared with the past generation.

During the past thirty years our *materia medica* has multiplied to no inconsiderable extent; old remedies have been discarded, a legion of new drugs introduced, crystalline and resinoid principles adopted to the almost entire exclusion of the crude substances from which they are prepared, and synthetical substances often take the place of alkaloids which were novelties but a generation ago.

You would expect, if I traversed the long list of crude substances that found their place even in the last editions of the London, Edinburgh and Dublin Pharmacopœias, with the object of showing the position they now hold, to learn that very many have fallen into disuse, that others are now unofficial, and many but seldom prescribed.

Certain drugs, notwithstanding, are as much relied upon to-day as they were half a century ago, and this is not to be wondered at when we remember that the medicinal value of such crude drugs as opium, cinchona, etc., depends upon the presence of certain well-defined chemical principles which we are accustomed to isolate, and upon the proportion present in the crude substance it is customary now to assess both medicinal and commercial value.

It is our practice also, as you are aware, to standardise these and similar drugs to contain a definite proportion of chemical constituent, so that the physician may use these remedies with greater precision.

Other drugs—the use of which still continues—such as jalap, scammony, aloes, gamboge, etc., are not prescribed as frequently as formerly; and to some extent this has arisen from absence of uniformity in the substances themselves.

A class of drug—not a large one, it is true—of which sarsaparilla is a type, is only occasionally prescribed, but largely used by the public, notwithstanding therapeutists have written upon its medicinal worthlessness.

Medicaments used as external applications have changed immensely; and we find lard, as a vehicular substance or as a basis

for ointments, has been displaced by solid and semi-solid hydrocarbons, or the more easily absorbed lanoline.

Plasters, again, which were formerly prepared both in great quantity and variety, are now but little prescribed, and we have become familiar with other oleates of powerful inorganic bases, such as oleates of zinc, mercury, bismuth, etc.

Concentrated percolates produced from some of the most potent drugs by alcohol, ether, and chloroform menstrua, either used separately or so blended that the entire active constituent of the drug may be removed, are now largely used, elegant examples of which are seen in the official liniments of aconite and belladonna, and the chloroform belladonna of the non-official formulary.

Such preparations as grey powder, antimonial powder, green iodide of mercury, notwithstanding they may be used for some specific purposes, still are in less use and esteem than formerly.

This is due to the want of uniformity even when freshly prepared, or to change and decomposition on the substances being stored.

Although the legitimacy of most of the changes must be acknowledged, still we cannot shut our eyes to the fashion that prevails in discarding antiquated, although well-tried remedies in favour of newly introduced drugs.

This practice is not wholly approved by the medical profession, for at the recent meeting of the British Medical Association at Birmingham, a leading London therapist protested against the rage for new drugs, and condemned the practice as fatal to the accuracy of observation and precision of treatment.

It is fashionable with some to prescribe medicines in the most concentrated form in which the ingredients are compatible, regardless of potency. While none can reasonably expect to go back to those days when each dose of medicine was consigned to the patient in a separate vial, still many can prove that the practice of prescribing concentrated medicines is not without danger to the public, arising out of an inability to measure an exact small medicinal dose.

In this fashion of undue concentration the pharmacist is most deeply plunged, indeed it is difficult to be persuaded that he himself has not largely contributed in bringing it about.

Everything nowadays must be concentrated—not to such an extent that experience and knowledge of chemical substances, drugs and menstrua would indicate might be resorted to, so that in the process of manufacture, subsequent storing, or use, no

variation from an official standard, when the preparation is diluted, would result. No, this will not do; but a concentration of two or three times over and above that which may with safety be practised is now an every-day requirement.

“Elegant pharmacy” has something to answer for, its products having been appreciated by the eye and palate of the public, without corresponding advantage to the physician in continuing his art of prescribing.

Then, again, the fashion of prescribing ready-made physic, which is increasing to such an extent as to be positively alarming, is a delusion and a snare to those who desire to retain their art of orthodox prescribing. This practice, which is increasing with leaps and bounds, has been condemned by a leading London physician of half a century’s experience, who writes: “There has grown up a habit of prescribing ready-made physic, of using compounds which contain a variety of drugs, each having different properties—a practice in which there is mental proclivity to regard the disease as suitable to the physic rather than to take the trouble to find a remedy that is suitable for the disease. This system is unpractical, unscientific, and least calculated to promote a knowledge of the medicinal legitimate use of medicine. In fact, the art of writing a rational prescription is in danger of being lost.”

One might continue to contrast remedies and comment upon styles and fashions almost indefinitely, but the examples given will suffice to show the changes that have been made in our time in reference to the substances comprising our *materia medica*.

Reflection must convince us that medical art is deprived of much opportunity, pharmacy undermined, the public not benefited, but, on the contrary, seriously damaged by a fashion that has of late years both prevailed and greatly increased, and which may be described as the injudicious selection by the public of medicines to be used as household remedies.

The public has always been in the habit of treating itself for minor ailments, and until late years its choice of medicines was fairly judicious and generally amenable to the influence of the medical profession acting through the usual channels.

An unfortunate fashion is now in the ascendency, and there is a disregard by the public for the simple, well-tried, and safe medicaments of the past generation, and a preference for medicines which are obtained under cover of a patent medicine stamp.

To condemn indiscriminately, as either useless or dangerous, all medicines that reach the public through the medium of the press, quite apart from the question of the medicine stamp, would be unjust, because many substances, simple in their nature and safe in the hands of the public, are by such means brought into greater prominence and are not inappropriate as household medicines.

While one could particularize many such, however, it is equally certain that a number could be named which are unsuited as remedies except in the hands of the medical practitioner; further, many are of such composition that they should not be sold without being placed under the restrictions which accompany the sale of substances similar in composition included in the schedule of poisons in the Pharmacy Act.

You are aware of the increased traffic in so-called "patent medicines" during the present generation, but perhaps have not realized the extent to which it has developed, and the great strides it is making annually without let or hindrance. In the year 1860 the revenue from medicine stamp duty was £43,000; in the year 1889, £203,000; and during the current year it is computed that £220,000 and upwards will be realized.

Now although there has been this marked increase in the sale of patent medicines during the past thirty years, the number of vendors has not increased in like proportion; for whereas in 1860 there were under 10,000 vendors, there are at the present time but 23,000, indicating, notwithstanding the total sales are five times as large as they were a generation ago, that the registration of vendors has only increased to half that extent, and the sale, consequently, by each licensed vendor has practically doubled.

You possibly have not reckoned how large a sum the public parts with in satisfying its craving for stamped medicines, and will be surprised to learn that the amount is not far short of one and a half millions sterling annually.

It is obvious that considerable advantages would accrue to the medical profession and pharmacy even if a proportion only of such sum were directed into the channels of legitimate medicine.

Those in contact with this evil have an opportunity of watching the results from a social standpoint, and cannot be expected to be oblivious to its medical aspect. Each year I have but little doubt finds you with stronger convictions that the unrestricted sale to the public of many substances and compounds which are now commonly sold as patent medicines, and which are easily obtainable on account of the facilities offered by the medicine stamp traffic,

is a subject of deep concern, and a prolific source of both mental and physical degradation to the public.

The medical profession is aware that a section of the public become habituated to the use of hydrate of chloral, opiates, and other narcotics solely from the cloak that is adroitly spread around this matter by the medicine stamp regulation.

Within the past month, and since my address has been in manuscript, the *British Medical Journal* has in a very able article, entitled "Poisons on Sale," directed the attention of the medical profession to this important subject. I endorse the views of that Journal when it says:—"The whole question of the sale of proprietary medicines demands serious consideration. The apparent official sanction of the Government stamp, which has actually no more intrinsic signification than that affixed to a promissory note, indicates some sort of official approval or guarantee of the virtues of the medicine itself. It is simply absurd that the sale of poisons—narcotics, for example—should be hedged about with legislative restrictions when their nature and strength are fully known, and that the very same poisons should be freely sold when their nature is a matter of conjecture and the proportion in which they are present is unknown and probably variable."

A refusal to supply poisonous patent medicines, except under a medical prescription, is resented by the public, and the patent medicine vendor, who may be a grocer, stationer, or any individual, without the faintest knowledge of drugs, may for a small fee to be paid for a licence, sow poisons broadcast.

The importance of this subject should be urged upon the medical department of the Privy Council by medical officers of health, coroners, and medical practitioners generally; and members of the Legislature should be asked to put pressure on the Chancellor of the Exchequer, so that notwithstanding his greed for revenue a continuance of the tax would be impossible.

As legislation for regulating the practice and sale of medicine is now all professedly for the safety of the public, it becomes a question as to whether the compounding of all proprietary medicines should not be subjected to similar restrictions to those imposed in Germany and elsewhere on the Continent of Europe, where the composition of each so-called patent medicine has not only to be stated to a recognised authority, but permission obtained for its sale.

In my opinion the time has come when the medicine stamp should altogether be dispensed with. Such a course would re-

commend itself to those free-traders who, although liberal in their views concerning the sale of harmless medicinal substances, are not advocates for the unrestricted sale of poisons to the public.

I have spoken lengthily on this unfortunate fashion in which the public now indulges to its own detriment, and to the great damage of the practice of medicine, and I feel confident that my suggestion will have your careful thought.

Any action you decide upon should have as its mainspring the better protection of the public, and the support and co-operation of the medical profession, not only in this matter, but in any desirable movement connected with the advancement of the art and science of medicine, may be confidently relied upon.

The time has at last come when those who practise legitimate pharmacy may, without arrogance, view their relation with the medical profession, and with the General Medical Council in particular, with the greatest satisfaction and pleasure.

For the past thirty years discontent has been rife, that pharmacists were not officially invited to co-operate with the body legally entrusted with the production of the British Pharmacopœia.

The Pharmaceutical Society's Executive had oftentimes to listen to bitter sayings which we have no wish to recall, and desire only to refer to the advice that the forbearing President invariably gave, viz., that "everything would come to those who would wait."

No little advantage has been derived from the fact that the editor of the Pharmacopœia, in his annual report to the General Medical Council, has never lost sight of the value of pharmacists' co-operation, nor an opportunity of showing of what practical value the pharmacists' information is in the production of the Pharmacopœia, which he, as editor, aims to make, not only an exponent of medicine as practised in Great Britain and Ireland, but a book of reference for the medical profession and pharmacists throughout the civilized world.

The British Pharmaceutical Conference has in some degree contributed to bringing about a better appreciation of pharmacists by the medical profession, for many of the more important communications that have appeared in the *Year-Book of Pharmacy*, have from time to time been the subject of favourable comment in the medical press, and have not been without their influence upon medicine and surgery.

The Association has been popular—and deservedly so—for in

its infancy it was fondled by the best pharmacists England has produced, and now in its maturer years we find it healthy and capable of doing good work.

Each member of this Association should strive for the maintenance and enlargement of the influence alluded to upon the medical profession, and no firmer step can be taken in this direction than by a strict adhesion to the admirable principles laid down at Newcastle in 1866 by the fathers of our Association, some of whom I am delighted to see amongst us to-day.

Men should never enter the ranks of pharmacy without a recognition of the absolute necessity for patient and persevering study and continuous observation and thought, and students must be disabused of the idea that the object of their education and work is solely for examinations. Those who always continue students, and learn that increased knowledge brings a wider field of thought and observation, are the backbone of this Association; those whose acquirements are completed with examination are millstones round its neck.

As a member of this Association for upwards of twenty-five years, I may be permitted to refer to the opportunity this annual meeting gives for knowing, cultivating, and enjoying the friendship of one's *confrères*.

There is necessity at the present time to counteract the depressing influence of the cloud that will persist in hovering over us as a trade, by our seeking individually and collectively not only to maintain, but also to advance by research and every possible means, all matters having a scientific bearing upon Pharmacy.

Dr. THRESH, in moving a vote of thanks to the President for his address, said it was of a most interesting and practical character, and was of itself sufficient to repay any one the time and trouble of attending the Conference. Among the many points which had been touched upon, that of fashion in medicine was one of the most important, and it was a thing which all intelligent people must deprecate. When he was first connected with pharmacy, the public used to rely mainly in their domestic treatment on rhubarb, senna, sulphur, salts, sweet spirit of nitre, and such remedies; but now they went in for all kinds of patent and proprietary pills, effervescent antipyrin, and other new remedies, and he must admit that the fashion was set them to some extent

by the medical profession. He had also been surprised to find even amongst educated persons an idea that a patent medicine was something superior to what could be obtained from an ordinary chemist, even on a doctor's prescription, and that this was guaranteed by the Government stamp. The sooner the public were disabused of this superstition the better it would be for every one, including both the chemist and the medical man. He had recently had many opportunities of coming in contact with members of the sister profession of medicine, and was pleased to find that there was a growing change in the spirit in which pharmacy was regarded. There were, it was true, some men who seemed to envy pharmacists their superior knowledge of pharmacy, but in the opinion of the more liberal members of the profession the scientific work done by the Pharmaceutical Society and by the Conference had undoubtedly been raising the status of the whole profession. He would move that the best thanks of this meeting be given to the President for his very able and interesting address.

Mr. F. BRANSON (Leeds) having seconded the motion—

Mr. G. F. SCHACHT, as senior Vice-President, put the motion. He did so with much pleasure, all the more from having himself occupied the position of President for two successive years, and found the difficulty of preparing a second address which should prove at all interesting. He had recently had the courage to re-read those two addresses, and found that whatever merit there might have been in the first was lacking in the second, which was a good example of an anti-climax. He could all the more therefore congratulate Mr. Umney on the success with which he had kept the good wine until the last.

The motion was carried unanimously, and was briefly acknowledged by the President.

The following Report of the Unofficial Formulary Committee, was presented by Mr. MARTINDALE, as Chairman :—

REPORT OF THE FORMULARY COMMITTEE

To the British Pharmaceutical Conference in Session.

As Chairman of the Formulary Committee, I have to report that at the end of last year, with the sanction of the Executive, our Committee published an Addendum containing nine formulæ, which was included in the *Year-Book*, and issued bound with the then existing copies of the Formulary. Our work for the present

remains in abeyance, pending the issue of an official Addendum to the British Pharmacopœia, but we hope to renew our labours after this is published. I may add that our labours have been remunerative to the Conference.

The PRESIDENT remarked on the great practical assistance which the Unofficial Formulary had been to chemists in making up prescriptions containing ingredients for which there was no official formula. It had greatly conduced to uniformity in such preparations.

The President then called for the first paper to be read, which was on—

THE ALKALOIDAL VALUE OF BIENNIAL HENBANES.

By A. W. GERRARD, F.C.S.

A question which some years ago occurred to me as worthy of investigation, a question which no doubt has often occurred to others, was whether any differences would be found in the alkaloidal values of the annual and biennial varieties of henbane. It is well known to be the custom in most countries to regard biennial henbane as possessing superior or more active therapeutic properties than the annual kind. Support is given to this view, and, moreover, it is encouraged, by the fact that the biennial is the kind found in most pharmacopœias. A search for evidence in support of this preference has not yielded satisfactory results, and there does not appear to have been any chemical or pharmacological investigations made which give support to the supposed superiority of the one kind of henbane over the other. As regards annual henbane, however, Royle, in his "*Materia Medica*," says that some cultivated in the botanical gardens of Saharunpore, and the extract made from it, were of excellent quality, as proved by trials made in the General Hospital, Calcutta. Something is known, too, of the first year's biennial root, for the late Mr. Peter Squire pointed out that this root and an extract made from it were relatively far more active than the leaf or its extract, and this statement was based upon some therapeutic experiments conducted by Mr. Gee, of St. Bartholomew's Hospital. No estimation of the active principles of this root appears to have been made. Thus it is seen that information on the question I wish to decide

appears to be of a very meagre description. This is shown by the remark in Flückiger and Hanbury's "Pharmacographia," that "no attempt has been made with accuracy to determine the relative merits of the two sorts of henbane." Likewise in Pereira's "Materia Medica," which states, "as the biennial variety is more highly developed than the annual, it probably possesses more medicinal activity, and, therefore, should be preferred." I am, however, unacquainted with any experiments demonstrative of its superiority.

The experiments I have conducted on this subject extended over four years; this was necessary in order to enable me to obtain three good specimens of each kind of henbane from different parts of the country. The parts of the plants used were, the leaves and tops of the annual variety, the first year's leaves and root of the biennial kind; likewise the second year's tops of the latter. These selections were made as, except the root, they represent the various sorts of henbane grown and sold in this country. As regards period of collection, the biennial first year's leaf was collected at the end of June, and the root of the same plant at the end of August, excepting in one case, when the root was collected in December. The flowering tops of the biennial plant were gathered in June and July. The annual leaves and tops, being always a later crop than the biennial, were picked at the end of July.

The method of treatment or process of extraction of the various parts was the same in each case, and may thus be detailed. The air-dried root or leaf was placed in a large shallow pan and dried over a water-bath until its weight remained constant. One kilogram of the dried substance was at once taken and reduced to powder; this was macerated and percolated with proof spirit till exhaustion was complete. The fluid portion was now distilled to remove spirit, and the residue from the still evaporated to a semi-fluid extract. For the purpose of removing resin-like and colouring matters, the extract was diluted with water containing 1 per 1000 hydrochloric acid until it ceased to precipitate, then again filtered and made to a volume of 100 c.c. by addition of water. For the removal of alkaloid the solution of the former process was treated with ammonium hydrate in excess, and the alkaloid shaken out therefrom three consecutive times with chloroform. The mixed chloroformic solutions were exposed to the air for a few hours to allow some free ammonia to escape, after which the chloroform was shaken with dilute hydrochloric acid, which

treatment removed the whole of the bases as hydrochlorates. After concentrating the hydrochlorates to a small volume, the bases are finally removed by a fresh addition of ammonium hydrate and several shakings with ether; on evaporation of the ether the bases were obtained in a partly crystalline, partly amorphous state.

The estimation of the bases in the previous residue was done volumetrically by means of a solution of hydrochloric acid, containing 35.5 of the acid in 10,000 parts. Each c.c. of this solution is equivalent to .0289 grams of either hyoscyamine or atropine; so assuming both alkaloids to be present, no error can arise from this method of analysis. In all cases but one, check analyses were made, and the figures obtained were confirmatory of the main results.

The accompanying table shows the variety of henbane, part used, where grown, and yield of alkaloids.

Variety and part used.	Where grown.	Yield of Alkaloids from 1000 parts.
Biennial roots	Middlesex	1.602
" "	Sussex	1.550
" "	Lincolnshire	1.729
" first year's leaf . . . . .	" . . . . .	.690
" " " "	Sussex . . . . .	.667
" " " "	Middlesex . . . . .	.592
" second year's tops . . . . .	" . . . . .	.672
" " " "	Sussex . . . . .	.680
" " " "	Lincolnshire . . . . .	.656
Annual leaves and tops	Leicestershire . . . . .	.641
" " " "	Surrey . . . . .	.689
" " " "	Middlesex . . . . .	.701

An examination of this table shows unmistakably three important facts. First, that annual henbane leaf, first year's biennial leaf, and second year's biennial tops have practically the same alkaloidal value. Second, that first year's biennial henbane root is much richer in alkaloids than leaf or top of either variety, containing two and a half times as much. Third, that locality of growth does not appear to have much influence on the amount of alkaloid present.

A few bearings of pharmaceutical interest having arisen in the course of the work, they may be referred to at this point. With rectified spirit the biennial root yields an excellent extract, an

extract which could be standardized with ease; the dose would be less bulky, being one-sixth to one-third that of the present official extract; it has also a comparative freedom from objectionable taste and odour. Should henbane and its preparations at any time receive consideration from the Pharmacopœia Committee of the General Medical Council, that body may be reasonably urged to make the biennial root and an alcoholic extract thereof official. Such an extract, I feel sure, especially if standardized, would prove a valuable addition to the armoury of drugs; it would provide a medical practitioner with a reliable alternative to the present uncertain and unpleasant extract, and an economical alternative to the very costly hyoscyamine.

As regards the preference which is shown for biennial over annual henbane leaves, it would seem that the preference has no good grounds, but is founded entirely upon prejudice. This prejudice may be accounted for by the more interesting natural history of the biennial plant, its two years of life, its fine and luxuriant growth, and probably its more profitable character; these, together with its selection by the pharmacopœias, have given it a position to which it certainly does not appear entitled.

Turning to the question of the therapeutic value of the two henbances, it is highly improbable any differences will be found, as their active principles are no doubt the same and present in the same proportions. This view is supported not only by Royle's remarks, already referred to, but by the fact that tinctures of both kinds of the drug have been used alternately for the same cases at University College Hospital, without any difference in action having been observed.

One other point brought out in the analyses is the fairly uniform alkaloidal strength of both varieties of leaf, which shows that if care be exercised by the pharmacist in selecting good, fresh English grown henbane, he may rely upon his preparations of the drug being of good quality and uniform strength.

In conclusion, I have to thank Mr. W. Holland, of Market Deeping, for providing me with an excellent supply of first year's biennial root, and, although collected so late as December, it proved to be the best of the three samples examined.

The PRESIDENT said that the Conference was much indebted to Mr. Gerrard for bringing forward this subject again. He recollected that some five or six years ago he corroborated some statements that had been made by Mr. Gilmour, of Edinburgh, with reference

to henbane, and he was glad to find that he had been continuing his observations. It was quite clear that pharmacists had been acting on a rule of thumb in only using the biennial plant, as it now appeared that the annual variety was quite as good. There had been some very remarkable researches lately with regard to the alkaloids and the conversion of hyoscyamine into atropine, which of course Mr. Gerrard had not lost sight of. He did not understand whether he had examined the roots of the annual henbane, but that was grown very largely by Mr. Holland, and it was certainly a subject on which more ought to be known.

Mr. MARTINDALE remarked on the abundance with which biennial henbane grew on the south coast, near Rye. The root of the annual plant was so small that he thought it would be of very little service. It was only when the plant continued growing during the winter that the root became fleshy and attained any appreciable size.

Mr. HASSELBY said he had taken a deal of interest in the growth of the various henbanes, his attention having been drawn to it by practical experience. When he was in business at Goole he purchased some biennial leaf without midrib, which he believed was the best, and made a tincture from it. Shortly afterwards, having to dispense a prescription written by a Hull physician, he made use of this tincture, but in a few days after the customer brought it back and asked him if he wished to poison her, for it was quite different from what she had previously obtained at first-class establishments. He got down the various bottles from which the prescription had been compounded, and when he came to the biennial henbane, she at once said that was what was wrong, for it smelt quite differently from anything she had had before. He suggested that he should take the bottle and ask his opinion of the physician, who at once said that was the right medicine, and since then he had nearly all that physician's prescriptions which came to his district. Mr. Gerrard, however, had shattered the delusion that the biennial henbane was the strongest. He had stated at the Hastings Conference that any chemist who had a garden could grow henbane for himself, but he had met with great initial difficulty in getting the seed, though he had tried in every conceivable direction. He tried some seed he had in his shop, but it was no good, probably from having been kiln dried; and though he tried north, east, south, and west, he failed to get any that would grow. All the seed he could get was annual, and he had the annual plant coming up year by year, and had

sent seed to a great many people, but had never heard whether it had been used successfully. If it were now settled that the alkaloidal value of the two tinctures was the same, still some would give up the biennial with regret; the odour it possessed and the resinous deposit it gave on being mixed with water gave the idea that it was the stronger. He had often thought that it would be well if experiments were made with tincture from the root or the seeds, and if that proved efficacious it would be for the Pharmaceutical Committee to decide whether the tincture of the leaves should be retained. He understood that owing to the high price of henbane, belladonna was being largely used in the London hospitals in its place, in one-sixth doses. He had made some experiments with a stock pill, substituting one-sixth quantity of belladonna for extract of hyoscyamus, and had had no complaints, but he thought it better to revert to the hyoscyamus, despite its high price.

Mr. R. H. DAVIES asked if the estimations had been made on the dried root or in the fresh condition in which it was shown, and the same with regard to the comparative estimations made of the leaves.

Mr. CORDER said this paper threw considerable light on a very vexed question. It had often been remarked that a quantity of dried medicinal leaves came from the Continent, which were of but small value, and they had been accustomed to think that it was because the annual henbane had been supplied; but he had good reason to think that it was not the *Hyoscyamus niger* at all which was sent in many cases, but another variety, *H. aureus*, which grew very plentifully in many parts of South Germany, and which possessed little medicinal value.

Mr. CRIPPS asked if the percentage stated referred to the alkaloids atropine and hyoscyamine only, because the dose of tinct. belladonnæ given in the Pharmacopœia was far less than that of henbane, and yet, according to his experience, belladonna leaf contained usually not more than '6 per cent. of alkaloid. It seemed strange, if the only alkaloids present were hyoscyamine and atropine, that a full dose of tincture of henbane did not sometimes act as a poison, and he hoped Mr. Gerrard would continue his experiments with a view of seeing whether there were any other alkaloids present. He was somewhat surprised to see the large amount of alkaloid obtained from the root, but he did not think it would be good commercial policy to depend on the root alone, as it would lead to the destruction of the plants.

Mr. WRIGHT said he found, as a rule, that henbane leaves obtained in commerce did not yield more than one-third the amount of alkaloid Mr. Gerrard had obtained from his samples. With regard to the tincture of belladonna, his experience was that it yielded a larger quantity of alkaloid than the tincture of henbane.

Mr. CONROY asked if the percentage stated of alkaloid in the root was from the annual or the biennial root.

The PRESIDENT said it was the biennial root, at the end of the first year.

Mr. GERRARD said he regretted it had not occurred to him to refer to Mr. Gilmour's paper, in which he believed the characteristics and history of the annual and biennial henbanes were treated. There was a good deal of what was called plant lore connected with this drug included in the paper, which made it very pleasant reading. There were many stories connected with henbane coming down from the monasteries in the middle ages, and Mr. Gilmour's paper, he thought, went a good deal into that side of the subject. As had been said already, the annual root was so small that it was not worth any one's while to make a research upon it. The difficulty Mr. Hasselby got into over his bottle of mixture no doubt arose from the fact that the leaf of the biennial henbane did contain far more of the odorous principle than that of the annual plant; moreover, the age of the tincture had an influence on the odour. The difficulty of obtaining biennial seed had been referred to, but if he remembered aright he sent Mr. Hasselby some, and he could vouch for its honesty. But there was a great difficulty in getting henbane seed to grow; he believed a large part of it was never fertilized, and sometimes the seed would lie fallow for years, and then suddenly spring up in large quantity. There was no doubt that belladonna was taking the place of henbane to a considerable extent, partly, he believed, because the physician felt that he could rely more on the uniform character of the former. In the hospital with which he was connected they now used a hundredweight of extract of belladonna per annum, whereas fifteen or sixteen years ago they did not use more than a few pounds. He had made a mistake in reading the figures, stating the quantity as '6 per cent., when he should have said per 1000. The yield of alkaloid in the root was $2\frac{1}{2}$ times as much as in the leaves, and he did not agree with Mr. Cripps that the root should not be used. The alkaloidal value was $2\frac{1}{2}$ times as great, and that might be put against the size of the root. The active principle in a standardized root extract would give it a more

definite character, and was reliable, besides which an alcoholic extract could be made which always worked up better in any preparation than an aqueous extract, and kept better.

The PRESIDENT tendered Mr. Gerrard the thanks of the meeting for his very able and interesting paper.

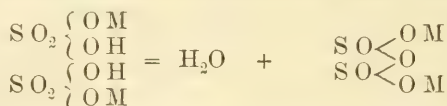
The next paper read was on—

COMMERCIAL ALKALINE SULPHITES.

By C. H. BOTHAMLEY, F.I.C., F.C.S.

Alkaline sulphites are now of considerable practical importance by reason of their use as disinfectants; as reducing agents; for the separation of aldehydes and ketones; and latterly, and in large quantities, in photographic processes.

Sulphuric acid is dibasic, and is generally supposed to form with alkali metals two classes of salts, the *normal sulphites*, represented by the general formula MSO_3 , and the *hydrogen sulphites*, *acid sulphites*, or *bisulphites*, represented by the formula $MHSO_3$. Recently, a third class of sulphites has been brought prominently forward—the so-called *metasulphites* or *metabisulphites*—and there seems to be a prevalent belief that they are new products. As a matter of fact they are not at all new, but were described many years ago by Muspratt, who gave to them their proper name, *anhydro-sulphites*. They have the general formula $M_2S_2O_5$, and may be regarded as derived from two molecules of the hydrogen sulphite, with elimination of a molecule of water; thus—



They stand to sulphurous acid in the same relation as the dichromates to chromic acid or the disulphates to sulphuric acid. They contain no hydrogen, and when heated give off no water, but evolve sulphurous anhydride and yield a residue of sulphate and free sulphur, no normal sulphite being formed at any stage of the decomposition (Berthelot), $2M_2S_2O_5 = 2M_2SO_4 + SO_2 + S$. They are very stable, and lose sulphur dioxide very slowly indeed at the ordinary temperature.

The object of my paper is to call attention to the character of the alkaline sulphites as they are met with in commerce.

The method of analysis which I always use is that described by Giles and Shearer (*Journ. Soc. Chem. Ind.* iii. 197 and iv. 303). The salt is added to a measured quantity (in excess) of decinormal iodine solution, and when all the sulphite has dissolved, the liquid is diluted and the excess of iodine determined by means of decinormal thiosulphate solution in the usual way.

Normal sodium sulphite, which crystallizes with seven molecules of water, is frequently met with in a well crystallized and pure form, but, on the other hand, it is not unfrequently contaminated with carbonate and sulphate. Any considerable proportion of the two latter salts makes the crystals efflorescent. Their presence arises from imperfect saturation with sulphurous anhydride, imperfect protection from the oxidizing action of the air, and the use of impure alkaline carbonate or hydroxide in the preparation of the salt.

From a laboratory point of view the acid sulphites and the anhydrosulphites or metasilphites are of greater importance, and they are also very important to photographers.

Potassium bisulphite I was unable to get, even after repeated application to several sources, and it may be taken that this salt is not an ordinary commercial product. This is true also of normal potassium sulphite. Sodium bisulphite, or, to be correct, a substance which was called sodium bisulphite, I obtained from several sources.

Here are the percentage amounts of sulphurous anhydride in different commercial samples of this salt.

I.	II.	III.	IV.
8.1	34.14	22.3	39.0

The calculated percentage for the anhydrous salt, NaHSO_3 , is 6.54! The chief impurity is usually sulphate.

As a matter of fact the bisulphites are extremely difficult to isolate, and it is doubtful whether they have ever been prepared in a state of purity. The analyses given by Marignac indicate the presence of much too low a proportion of hydrogen, and Berthelot (*Ann. Chim. et Phys.* [6], i. 86) endeavoured to obtain potassium bisulphite, but succeeded only in preparing products which when heated lost 2.6 to 3.9 per cent. of water, the calculated loss for the bisulphite being 7.5 per cent. I may add that I have made several attempts to prepare both sodium and potassium bisulphites, but without success. The difficulty arises from the fact that even in

solution the bisulphites quickly change into the anhydrosulphites, the change in the case of the potassium salt being accompanied by the development of +5.2 calories for each molecule of anhydrosulphite formed (Berthelot, *loc. cit.*, p. 84).

The anhydrosulphites are met with in commerce in small crystals, and also in large well-formed crystals, which at first are transparent, but soon lose some sulphurous anhydride and become covered with a white opaque film, after which the salt undergoes very little alteration. The percentage of sulphurous anhydride in several commercial samples of the potassium salt I found to be—

I.	II.	III.
52.54	56.02	57.42

The calculated amount is 57.63 per cent. Sample III. was in large crystals; Sample I. was in somewhat small crystals. Two samples of the sodium salt were examined with the following results:—

I.	II.
65.60	50.4

The calculated percentage is 67.37. The first sample was in large crystals; the second was granulo-crystalline.

Samples of potassium anhydrosulphite which I prepared myself, by saturating cold or hot solutions of potassium carbonate with sulphurous anhydride, contained 56.1, 56.5, 56.2, 57.2, 57.5, and 57.6 per cent of sulphurous anhydride respectively, the impurity in the first three cases being sulphate. A sample of the sodium salt prepared in a similar manner contained 64.3 per cent., but the preparation and crystallization of the sodium salt is more difficult than that of the potassium compound, at any rate on a small scale.

The practical conclusions to be drawn from my observations are: (1) That the so-called sodium bisulphite of commerce is, as a rule, a very impure preparation. (2) That whenever a pure acid sulphite is required, potassium or sodium anhydrosulphite (meta-sulphite, meta-bisulphite), in large well-developed crystals, should alone be used, the finely crystalline samples being trustworthy for only a short time after their preparation.

My thanks are due to Mr. F. W. Booth, a student in the chemical laboratory of the Yorkshire College, for his assistance in making these experiments.

The PRESIDENT said the alkaline sulphites were of great value, both in the arts and in medicine, when large quantities of sulphurous anhydride were required.

Dr. THRESH said he was not aware that these salts were used except for antiseptic and disinfecting purposes, and, even for these purposes, it would be a great advantage if any chemist could discover a more effective germicide. When a medical officer of health had all the doors and windows of a cottage closed up, and burned sulphur, he satisfied the minds of the people that the place was disinfected; but he did not always satisfy his own mind, and if some aerial disinfectant could be obtained which would kill all bacteria, and yet would not take the polish off the furniture, or affect the colour of the draperies, it would be a great boon to medical officers and to humanity at large. He remembered that during the time of the cattle plague, some veterinary surgeons were anxious to try the effect of bisulphites, and he had obtained and experimented with a good many samples, but he came to the conclusion that they contained very little sulphurous acid, so that if that were the potent agent, it was a mistake to employ bisulphites.

Mr. SIEBOLD asked if Mr. Bothamley had also extended his experiments to calcium bisulphite, and if so, whether that was not a much more satisfactory preparation than the corresponding sodium or potassium salt? Many years ago, Dr. Gerland had shown that when calcium phosphate was dissolved in sulphurous acid, the solution could be evaporated practically without any loss of sulphurous anhydride. He had not, however, seen any allusion to the subject in literature since.

Mr. NAYLOR said he was very much surprised to see the result shown with regard to the normal sulphite of sodium. He had had an opportunity of examining this compound for some years, from time to time, and had found in years gone by quite as much as 20 or 30 per cent. of sulphate, but he did not know where the author's samples had been collected. It was quite an easy matter to obtain sulphite of sodium which contained as small a quantity as 5 per cent. of sulphate. He did not think bisulphite of potassium was obtainable in the market except in the form of a very strong solution, and the same with bisulphite of ammonium, which he was not aware ever had been obtained in the crystalline form.

Mr. R. H. DAVIS, referring to the statement that the acid bisulphite was used for the removal of ketones and aldehydes, asked whether the use of metasilphite or anhydrosulphite was equally effectual with the more usual compounds for that purpose.

Mr. BOTHAMLEY, in reply, said one point raised by Dr. Thresh was the use of sulphur dioxide as a disinfectant. It did not bear exactly upon the paper, but it raised one or two interesting points. It had been shown that when sulphur was burnt at least 8 per cent. of the sulphur was converted, not into sulphur dioxide, but into trioxide, and the corrosive effect of sulphur dioxide produced by burning sulphur in that way would be very much greater than that of perfectly pure sulphur dioxide. The germicidal action of sulphur dioxide seemed to be of a selective kind. Dr. Percy Frankland had shown, some years ago, that whilst it did certainly kill a large number of germs, others flourished quite vigorously in its presence. He was not aware whether any special experiments had been made with regard to its action on the zymotic germs as distinguished from numerous other kinds. He had not made any experiments on calcium bisulphite, because it was not a product commonly used in the laboratory, and his attention was called to this matter by the extremely unsatisfactory action of the sodium bisulphite which he obtained for laboratory and other purposes. The mere fact that one could evaporate solution of calcium bisulphite so called without loss was tolerably conclusive evidence that it was not calcium bisulphite but calcium anhydrosulphite. It appeared, as far as all the evidence went now, that the hydrogen sulphites or bisulphites could not be got in a pure state any more than hydrogen chromates or true bichromates. Just as upon adding to chromate of potassium half the amount of base you got, not a hydrogen chromate, but potassium dichromate, $K_2Cr_2O_7$, so it was with the sulphites, $Na_2S_2O_5$. So far as he knew, bisulphite of ammonium had not been obtained in a crystalline form. In reply to Mr. Davis's question, whether the anhydrosulphites were equally effective in separating aldehydes and ketones, the answer was in the affirmative. Berthelot had shown conclusively that even if caustic potash or caustic soda were mixed with sulphur dioxide in the proportion necessary to form a bisulphite, in about ten minutes at the outside, at ordinary temperatures, all the salt in the liquid had changed into the anhydrosulphite, and therefore what was commonly regarded as a solution of bisulphite was simply a solution of anhydrosulphite, exactly the same as would be made by dissolving one of those salts in water. The much greater purity of those anhydro salts was doubtless the reason why they were so much more satisfactory for that kind of work, and was one of the reasons which led him to bring these notes before the Conference.

The PRESIDENT said he was sure the meeting would accord its thanks to Mr. Bothamley for his interesting communication.

The following papers were, in the absence of the authors, read by Mr. RANSOM, Honorary General Secretary,—

NOTE ON *STROPHANTHUS HISPIDUS*.

By E. M. HOLMES, F.L.S.

Since the introduction of *strophanthus* into the practice of medicine, the seeds obtainable in commerce have been observed to vary considerably in appearance and quality. The preparations made from them have also been found to differ so much in strength, or at all events in therapeutical action (some being almost inert), that many physicians have discontinued the use of the drug.

The remarks I have now to offer are made therefore with the view of obtaining a greater uniformity both in the preparations of *strophanthus*, and in the quality of the seeds employed to make the preparations, since uniformity of strength will depend more on the quality of the seed employed than on the exact proportions of seed and strength of spirit used. The physiological experiments made by Professor T. R. Fraser were, he informs me, made with the greenish-fawn coloured seed, of which a specimen, presented to the Museum of the Society in Bloomsbury Square, is now placed on the table. The plant which yields these seeds has been described and figured by Professor Fraser in the "Transactions of the Royal Society of Edinburgh," vol. xxxv. pl. iv. (No. 21), pl. i-viii. The first specimens of the plant, consisting of a few leaves and flowers, were described some years ago by Professor Oliver in Hooker's "Icones Plantarum" (3) vol. i. pl. iv., 1871, p. 79. pl. 1098, under the name of *Strophanthus Kombé*, Oliv.; but this he now regards as "a variety, a geographical race of *S. hispidus*" ("Trans.," *S. hispidus*, *l.c.*, p. 975).

Further specimens of the plant said to yield the seed employed by Professor Fraser, were sent by Mr. Buchanan to the latter, and from these the description and figures given in the paper above quoted are drawn. The flowers of these specimens have been submitted by Professor Fraser to Professor Oliver, who expresses the opinion that they are the flowers of *S. hispidus*.

But the seeds employed by Professor Fraser differ both in size and colour from those obtained from the typical *Strophanthus*

hispidus of the West Coast of Africa, as will be seen by comparison of the commercial specimen of *S. hispidus* seeds (on the table), with those presented by Professor Fraser. This difference is not confined to one particular sample; the seeds from the Niger territory presented some years ago by the late D. Hanbury, and others from the Gold Coast recently contributed by Dr. J. F. Easmon, having the same brown colour and small size as the commercial seeds of *S. hispidus*. All the plants of *S. hispidus* that I have seen at the Kew Herbarium and elsewhere present the same character of thin leaves with brownish, hispid hairs, and differ from the thicker leaves with more prominent veins, present both in the original specimen of *S. Kombé* and in a recent specimen of the plant sent by the Rev. M. Frere to Sir John Kirk, and by him to Professor Fraser, and which the last-named gentleman kindly allowed me to examine. If further material should subsequently show that the plant deserves specific rank, the name *S. Kombé*, Oliv., can then be restored without causing any confusion. I would suggest therefore that until good flowering and fruiting specimens of the plant have been procured, Professor Fraser's seeds should be distinguished by the name of *S. hispidus*, var. *Kombé*, so that they may be kept distinct in commerce from the smaller dark brown seeds from the West Coast of Africa.

Without entering further at present into the somewhat intricate facts connected with the plants stated to afford the *strophanthus* seeds of commerce, I wish now only to emphasize the fact that the seeds used by Professor Fraser, and therefore the kind from which the medicinal action described by him should be expected, differ from those yielded by the typical *S. hispidus* of West Africa. Consequently, if seeds of *Strophanthus hispidus* be obtained commercially from the West African plant, the preparations made from them may differ considerably in action from those obtained commercially from East Africa. To say the least, one factor contributing to the variability of preparations of *strophanthus* may be eliminated by refusing to employ the West African seeds until they have actually been proved to be chemically and physiologically identical with those from East Africa. The other points to which I wish more particularly to direct attention are :—

1. That the seed used by Professor Fraser possessed the following characters. In bulk some of the seeds appear to be of a greyish green colour, and others of a fawn colour. This, however, is an optical illusion, which is readily dissipated by altering the angle and direction of the seeds to the light. The hairs on the

seeds all point in one direction, and are somewhat appressed to the seed coat. If the seed be first presented towards the light so that the apex is towards it, and then the seed be reversed, so that the base of the hair is presented to the light, it will be seen, by varying the angle of incidence, that the fawn colour appears green, and *vice versa*.

2. The seeds vary in quality according to the degree of ripeness of the pods and the carefulness with which they have been dried. On breaking a seed across it should exhibit a firm white endosperm, showing under a good lens a line marking the enclosed cotyledon. All seeds that are shrunk or shrivelled, or that show a yellow or dark coloured interior, should be discarded. The average length of the seeds is given by Professor Fraser as 0·6 to 0·7 inch, and the maximum width 0·14 to 0·16 inch, the average weight being 0·4 to 0·6 grain.

3. All seeds that have not a hairy surface, and in which the hairs do not present the alternating greyish green and fawn colour, should not be employed. There has occurred in commerce a mixture of glabrous seeds with hairy seeds, and also a somewhat twisted non-hairy seed belonging to a different genus, *Kickxia africana*. The latter are easily recognised by the different shape and the fact that the cotyledons are seen to be doubly folded when a seed is broken transversely. If the above directions are followed and the uniformity in strength of tincture already proposed by Professor Fraser be adopted, this valuable and powerful drug will I think regain in great measure the favour which it has lost in the hands of some physicians.

It may be of further interest to point out that ouabain, which is said to differ slightly in chemical formula and therapeutical strength from strophanthin, is now obtained (exclusively, I believe) from the smooth strophanthin seeds sold under the unscientific name of "*Strophanthus glabrus*." Ouabain was first obtained from the wood of a plant which has been named *Acocanthera Ouabaio*, but of which, I believe, the pods have not been seen. As the "*Strophanthus glabrus*" seeds come from the Gaboon, and these appear in commerce mixed with the hairy strophanthus seeds, it is obvious that strophanthin obtained from such a mixture will necessarily be a mixture of a strophanthin with ouabain. The reason why ouabain (which is, I believe, chiefly manufactured in France), is now prepared from the "*Strophanthus glabrus*" seed is because a much larger percentage of the active principle is obtained than from the wood. The plant must unfortu-

nately still go by its commercial name, since it cannot be accurately described until fruit and flowers and leaves of the *same plant* are available. There is already in the Herbarium of the Pharmaceutical Society a specimen of a *strophanthus* from the Gold Coast with glabrous leaves, which probably yields the seeds in question, but as the fruit did not arrive with the flowering specimen, this point cannot at present be definitely proved. For the same reason another specimen of apparently the same species from W. Africa remains unnamed in the Kew Herbarium. Under the circumstances it would perhaps be advisable to distinguish this plant by the temporary name of *Strophanthus Ouabaio*, and to apply this name to the smooth *strophanthus* seeds from the Gaboon, since there are other species of *strophanthus* having glabrous leaves and seeds.

NOTE ON LEAVES OF A PLANT YIELDING OUABAIN.

BY THOMAS CHRISTY.

The two leaves sent herewith are from a plant that I have grown at Sydenham from selected seed similar to that so fully described by Mons. Arnaud, of Paris, in the *Comptes Rendus*, and from which he obtained ouabain. Although I have planted large numbers of this variety of seed, I have only been able to raise one plant, which is about two feet high. Those members who saw my specimens of *strophanthus* last year, or those who are conversant with this type of plants, will observe that there is no similarity in the leaves, these being glabrous, but when I closely examined the stem I observed that there is a corky formation at the points from which the leaves have fallen. I have one other variety of plant that has been reared from what has been known as being "long hispidus" seed, which has a very small glabrous leaf about one and a half inches long, and which I exhibited at the last year's Pharmaceutical Conference, with similar formation. I consider it premature to give this variety of plant any name until the full details arrive, which I expect will be next month, more particularly as Mons. Arnaud tells me the properties yielded by this plant are so different from those of any variety of *strophanthus* he has examined.

The PRESIDENT said the Conference was much obliged to Mr. Holmes for this contribution, which had arrived at a very oppor-

tune moment, inasmuch as the General Medical Council desired that strophanthus should be one of the drugs added to the B.P. He was constantly seeing strophanthus in the London drug market, and the more he saw of it the less certain he felt about it. His colleagues on the pharmaceutical committee also felt a certain amount of uncertainty about this drug, and therefore the co-operation of Mr. Holmes was most opportune. They all knew that Professor Fraser's work on this subject had been of the most thorough character, and that hardly any paper ever sent to the Conference had been of such great value. Mr. Christy had sent him that morning some leaves from some of the plants growing in his greenhouse, but he was by no means certain of the actual variety of strophanthus that the ouabain was derived from.

Mr. MARTIN said he had had a fairly large experience of the use of strophanthus, and considered it the most valuable drug of vegetable origin which had been introduced into medicine during the last decade. It was therefore most important that its botanical and commercial history should be better known. There was no doubt a certain amount of confusion surrounding the collection and importation of the seed, arising from circumstances which it was almost impossible to control, because it was very difficult indeed to trace the seeds which were offered in the market and know what plant it was which actually yielded them. The great importance of the drug was shown by the fact that during the last five years about one hundred papers and monograms had appeared with regard to it. The earlier experiments by medical men on the physiology and therapeutics of the drug were undoubtedly made with seeds which correspond to the greenish fawn-coloured variety, and when those were obtainable good results were almost uniformly recorded; but when it became impossible in the London market to get those seeds, and they were thrown back on the brown variety, which were nearly glabrous, complaint arose of the difference of results, the therapeutic effect not being the same. He had hoped that Mr. Holmes' paper would have cleared up the history of the seed rather more than it appeared to have done, and that there would have been something more certain to guide them as to the botanical and geographical sources of the seeds which are imported and used in this country. He had had no experience with ouabain.

A vote of thanks was accorded to the authors.

The next paper read was on—

THE ESTIMATION OF NITRITES IN POTABLE WATERS.

By JOHN C. THRESH, M.B., D.Sc.,

Medical Officer of Health.

At first sight the subject of my paper may seem somewhat out of place at a meeting specially intended for the advancement of pharmacy, but so many of our advanced pharmacists are interested in water analysis, and on previous occasions when kindred subjects have been brought before you they have been discussed with so much ability, that I feel no further apology is needed as an introduction to my paper.

Probably no analyst feels that he has made a complete examination of a water unless he has at least made a qualitative test for nitrites, and if he finds indications of their presence he justly regards the water with suspicion, but, uncertain what further inference to draw, a quantitative examination is rarely made. Though this quantitative analysis therefore does not seem to be a matter of much importance in the present state of our knowledge, a series of experiments I am now making on the changes in composition of certain waters, by keeping under varied conditions, lead me to believe that ere long the study of these changes will be of great aid in enabling us to judge of a quality of a water, and especially of those waters which at the present time the chemist or medical officer can only state to be suspicious. One of these changes and one of the most easily followed is the variation in amount of nitrous nitrogen. As an example I will quote that of the most extreme case I have yet met with. A water which from a mere chemical analysis would have been passed as "usable" when examined soon after drawing from the pump showed no trace of nitrites. Three days after it contained no less than 3.5 parts of nitrous nitrogen per litre, and on the sixth day after, it was again free from nitrites. Other changes proceeded *pari passu*, and these, together with a bacteriological examination, proved the water to be seriously contaminated.

It was when commencing this investigation that the want of a simple and reliable quantitative test for nitrites made itself felt. The metaphenylene-diamine and the naphthylamine tests were fairly tried, but did not answer my purpose, neither did titration with potassium permanganate. In working out the

process for determining the amount of dissolved oxygen in water which I described early this year in a paper read before the Chemical Society, the action of nitrous acid on potassium iodide in the presence of a varying proportion of free oxygen was determined, and the results led me to believe that after all the old potassium iodide and starch test for nitrites could be made a reliable colorimetric quantitative one for water analysis. The results of my experiments having this for their object, may be summarized as follows:—

1. With the same proportions of acid, starch, and potassium iodide, the rapidity with which the blue tint is developed, and the depth of tint varies with the degree of oxygenation of the water.

2. The depth of tint increases with the time which elapses between the addition of the reagents and the observation. This is due to the fact that the NO liberated is acting continuously as a carrying agent between the oxygen dissolved in the water, and of the air in contact with the surface of the fluid and the hydric iodide, liberating an equivalent of iodine corresponding to the oxygen carried.

3. The effect of temperature is such that comparisons cannot be made unless the fluids are within 2° or 3° of the same temperature. Thus, *e.g.*, at 65° F., in very weak solutions, the colour is not developed so rapidly as at 60° F., *ceteris paribus*.

4. With the same proportions of starch and iodide, and in samples fully oxygenated, etc., the coloration varies with the amount and nature of the acid used.

5. The amount of potassium iodide added affects the result considerably. The larger the proportion of iodide, within certain limits, the greater the rapidity of the reaction.

6. The quantity and nature of the starch solution are also factors requiring recognition. If too large a proportion of starch be added, a marked reddish tint is first developed instead of the blue tint, and this reaction is still more marked if the starch solution has begun to change by keeping.

7. When all the above factors are constant, then the rapidity with which the blue tint is developed and the depth of tint varies directly with the amount of nitrite present in the water.

I need not trouble you with the account of the numerous experiments upon which these conclusions are based, nor of the further investigation conducted to ascertain how the information so obtained could be made available for rendering the iodine and

starch reaction reliable as a quantitative test. I will merely give you now an account of the reagents required, and the mode of conducting the analysis which I have found to give the most satisfactory results.

Reagents—

1. *Solution of Starch and Potassium Iodide.*

Starch in powder	. . . . .	2 gram.
Caustic Potash	. . . . .	1.0 „
Potassium Iodide	. . . . .	2.0 grams.
Water	. . . . .	200 c.c.

Add the starch to 10 c.c. of water, and when uniformly diffused add the caustic potash. Dissolve without the aid of heat and add the remainder of the water and the potassium iodide. Strain or filter. This solution keeps for months without appreciable change. One c.c. is required for each determination.

2. *Dilute Sulphuric Acid.*

Pure Sulphuric Acid	. . . . .	1 vol.
Distilled Water	. . . . .	3 vols.

This is the same strength as used for the permanganate test, and I always employ it for both purposes.

3. *Solution of Sodium Nitrite.*

Sodium Nitrite	. . . . .	.493 gram.
Water	. . . . .	1 litre.

Dissolve—

1. c.c. = .1 mgrm. nitrogen.

Apparatus.—Two or more 50 c.c. Nesslerizing cylinders.

Process.—Shake the sample of water vigorously in a bottle only partially filled, to saturate with air; pour 50 c.c. into the cylinder, and add 1 c.c. of the starch and iodide solution, and afterwards 1 c.c. of the dilute acid. Stir. Assuming the temperature to be about 60° F., if a dark blue tint develops instantaneously, the water contains more than 1 per million of nitrous nitrogen. If it becomes blue in a few seconds, it contains about .1 per million. If it requires more than 10 seconds to develop, it contains less than this amount.

If the blue colour appears instantly, the water must be diluted with known proportions of nitrite free water (saturated with air) until it is found by experiment that the colour takes a few seconds to develop.

With a very little experience the approximate amount of nitrite present can be ascertained with considerable precision by these simple preliminary experiments. Now prepare a standard solution of sodium nitrite by diluting 1 c.c. of the strong nitrite solution with 200 c.c. of water. One cubic centimetre of this weaker solution diluted to 50 c.c. corresponds to .01 mgrm. nitrous nitrogen per litre.

Measure into the Nessler glasses varying quantities of this dilute nitrite solution, and fill up with water. Now take 50 c.c. of the water to be examined, or of the diluted water if dilution were found necessary, and to each add successively 1 c.c. of the starch and iodide solution and dilute acid, and note how the blue tint develops. If none of the solutions correspond with the water a fresh series must be prepared. In this way in a very few minutes the amount of nitrite in any sample of potable water can be easily obtained with a very considerable approach to accuracy.

Since I commenced employing this test I have analysed over 180 samples of water, 51 of which contained nitrites, varying from .005 to 3.4 parts nitrogen per million, and I have had no reason to suspect inaccuracy from the interference of other constituents in any single case.

To render the process more intelligible I will give details of two determinations, and also, with the permission of your President, make an estimation in your presence. Two solutions were prepared for me by an assistant, and marked "A" and "B" respectively.

A. Fifty c.c. + reagents gave a blue tint in about ten seconds. It was therefore about the proper strength for estimation.

Ten c.c. of the dilute nitrite solution was diluted to 50 c.c. and compared with the sample. The colour seemed to develop a little more rapidly, but the difference was not very marked. Three solutions were prepared by diluting 5, 7 and 9 c.c. respectively of dilute nitrite solution to 50 c.c.

5 c.c. = .05 N per million	.	.	.	too weak.
7 c.c. = .07	„	.	.	„
9 c.c. = .09	„	.	.	too strong.

Another solution containing .08 N per million was then made and compared with the sample; the blue tint developed a little more rapidly. The strength was certified to be .075 N per litre. The actual strength was .07 per litre.

B. Original water gave a dark blue instantly.

Diluted to $\frac{1}{10}$ th a pale blue instantly.

„ $\frac{1}{25}$ th colour developed in a few seconds.

Compared $\frac{1}{25}$ th with .05 . . . too weak.

and „ .10 . . . little too strong.

Now compare with—

.08	.	.	.	.	.	.	.	too weak.
.09	.	.	.	.	.	.	.	about right.
.10	.	.	.	.	.	.	.	too strong.

.09 + 25 = 2.25 N per litre. The actual strength was said to be 2.5 N per litre.

The following results may also be quoted as fair examples of the accuracy obtainable:—

		Nitrous Nitrogen per litre.	
		Present.	Found.
1.	.	.1 per million	.10 per million.
2.	.	.625	„ .65
3.	.	.625	„ .625
4.	.	.093	„ .095
5.	.	.01	„ .01
6.	.	.05	„ .05
7.	.	.125	„ .13

The time occupied by a determination is usually about five minutes, the reagents are easily made and preserved, and the necessary conditions easily observed. I can therefore recommend the process to such of you as may desire at any time to estimate the nitrites in potable waters.

The PRESIDENT said the Conference was much obliged for this communication. Public analysts and pharmaceutical chemists were frequently called upon to make a determination of the qualities of drinking water, and any process which simplified the matter was very valuable.

Mr. STROTHER asked if any gentlemen present had made an analysis of the water of Leeds. He was given to understand there was an absence of lime from the water, which had a certain effect on the osseous formation of young children.

Mr. REYNOLDS said there was very little lime in the water of Leeds. At Newcastle last year some very useful work was done in spreading information as to the great danger which threatened large populations in connection with lead in the water supply.

Fortunately the water in Leeds was not so wanting in lime as to have that action upon lead pipes, but one must admit that under some conditions, especially when the pipes were connected with hot water cisterns, a slight action did take place. The question, however, referred to the influence of lime on the growth of young children, and upon this he had no information to offer. Like most other towns which had imitated the example set by Glasgow in taking Loch Katrine water, the people of Leeds had been seeking for moorland water of a soft character, and nearly all towns in the West Riding had done the same. Mr. Rimmington had had a large experience in that matter with reference to the water of Bradford, and anything he might say would be quite as interesting to the meeting as information with regard to Leeds; as to that he would only say that in Leeds water there was under 6 grs. per gallon of solid matter, and the hardness was about 4° .

Mr. RIMMINGTON said that the solvent action of water, in his opinion, depended in a great measure upon its softness and the absence of sulphates or calcic salts. The remarkable thing was that in Bradford lead-poisoning had commenced suddenly. Since a certain dry summer, people supplied from the high-level had complained of the dangerous properties of the water, and many cases of illness had been attributed to lead-poisoning. It was rather difficult to trace the matter out, and to find exactly where the point was. The subject, however, was one which he would rather not discuss in public.

Mr. STROTHER said he knew a case in which a child's health was so unsatisfactory that the father had been to Nottingham to consult a physician, who had given the opinion that it was owing to the absence of lime in the water, and recommended lime water and milk as a remedy.

Mr. SIEBOLD said he had listened with particular interest to the statement that a sample of water which was free from nitrites when first examined was found to contain nitrites within the short space of a few days, and that after a few days more they had completely disappeared. He regarded the observation of these rapid changes as a very important one, which he hoped Dr. Thresh would follow up further. It showed that the significance of nitrites in water and their relation to bacterial life was not yet fully understood, and that their absence in a sample of water on the day of the analysis afforded no proof that the conditions favourable to their formation might not be, or have been, present in a marked degree. Under these circumstances it appeared to

him that the careful watching of changes in a sample of suspected water might in future become a not unimportant feature in the analysis. While touching upon this point, he might be permitted to allude to still another direction in which water analysis might be usefully extended in certain cases. About eighteen months ago he received from a well-known medical gentleman a sample of water suspected of having caused illness. The analysis yielded no result justifying him in condemning the water. But a long time afterwards he noticed that the bottom of the stoppered bottle in which the remnant of the water had been kept was thickly covered with fungoid vegetation. In the course of further experiments he then made with this water he noticed that upon slightly acidifying the filtered water with dilute hydrochloric acid and evaporating down to a few drops, the residue, when treated with potassium ferricyanide and afterwards with ferric chloride, produced a distinct precipitate of prussian blue. As this reaction could in this case not be due to nitrites or sulphites, and as the presence of vegetable alkaloids and similar principles capable of producing it was out of the question, he felt inclined to regard it as possibly due to a ptomaine, since all bodies of this class give the reaction. Unfortunately there was not sufficient material left for submitting this supposition to definite proof. He mentioned this observation in order to point out that in the examination of really suspicious waters a careful search for ptomaines might prove an important link in the chain, and one which had hitherto received little or no attention.

Mr. SCHACHT asked if Dr. Thresh had formed any idea whether the presence of nitrites was likely to be due to the oxidation of nitrogen not previously in combination with oxygen, or from the deoxidation of a more advanced salt of nitrogen. Probably the general experience was that when nitrites were found it was due to an imperfect oxidation of nitrogen, and that when further opportunities were afforded for the natural purification of water they would ultimately appear as nitrates; but he could hardly understand the slight reference Dr. Thresh had made in this case by that supposition, for in a few days it would be scarcely possible for that large quantity of nitrites, to appear from the action of de-oxidation.

Mr. RIMMINGTON said he had often found in water containing nitrites there was no albumenoid ammonia.

Mr. SCHACHT thought Mr. Rimmington would hardly mean to lay that down as a universal law.

Mr. RIMMINGTON said he had frequently found it.

Mr. JOHN BARCLAY said some few months ago two samples of water came under his notice, both supplied from the same source, but one coming through lead pipes and the other through zinc. On analysis it was found that that supplied through zinc contained nitrites, whilst that which came through lead showed none, the inference being that the zinc had caused the presence of the nitrites. Whether it had converted them from nitrates, or what was the explanation, it was hard to say.

Mr. SCHACHT said he was very glad to find that Dr. Thresh's experience coincided with the view which Mr. Ekin urged on a previous occasion, that they should still place reliance on the old tests.

Dr. THRESH in reply said waters containing nitrites might be divided into two classes; one, those in which nitrites were found on a first examination, but on examining the water day after day the nitrites decreased until they disappeared. In the other class the nitrites increased up to a maximum, and the probability then was that they would disappear also. In one case in particular, as the nitrites increased the nitrates decreased, until ultimately there was not a trace of nitric nitrogen present, but the whole of it was reduced to the nitrous condition. But to his astonishment there was no increase in the amount of free ammonia, while on the other hand there was a very large increase in the albumenoid ammonia. The study of that water required to be carried further, because it had opened up a number of interesting problems. Mr. Siebold had mentioned ptomaines, and the same thing had occurred to him, because this increase of nitrites he certainly thought pointed to the presence of ptomaines, and on mentioning it to Mr. Siebold, he said he had come across a water of a very similar character. He certainly was of opinion that watching the changes which took place in some of these waters would be ultimately of primary importance. It was possible it might be found that those organisms which had a deleterious effect on human life had a certain influence on the organic matter present in the water, whereas other organisms of a different character might have a different influence. By watching carefully these changes results might ultimately be obtained of considerable importance to the health of the community. There was no doubt that some waters contained nitrites, and also traces of zinc. At one time whenever he obtained a water with nitrites he always asked whether it came through a galvanised pipe or an iron pipe; but

he laid little stress on that now, when he found in the same water at different times a fairly considerable quantity of nitrites or perhaps none at all. It might be advisable to ask the question in order to ascertain if it were possible that they were reduced by the action of the metal.

In the absence of the authors the following papers were read by Mr. Naylor:—

REPORT ON THREE YEARS' EXPERIENCE OF CHLOROFORM WATER AS A PRESERVATIVE.

By JOS. F. BURNETT, F.C.S.,

Pharmaceutical Chemist.

It may be remembered that some time ago I published a short note on the use in pharmacy of chloroform as a preservative. My excuses for writing again upon the subject are, that it appeared in the "Blue List" of the Conference, and that I have continued to use it, and do so now systematically.

For the keeping of various chemicals in solution, so as to be convenient in rapid dispensing, nothing that I have tried is so effective, and at the same time so free from objection. It is of course not needed for the solutions of inorganic substances, such as potassium bicarbonate, magnesium sulphate, potassium bromide, etc., which are kept at most dispensing establishments. The advantage is evident in the case of solutions of organic chemicals, which are prone to decompose, ferment, etc., through the presence of fungoid organisms. The following is a list of those which I regularly keep made, in each instance solution being effected by dissolving the substance in B.P. chloroform water, and adjusting the strength by a final addition of more chloroform water. Citric acid, 1 in 2; potassium acetate, 1 in 2; potassium citrate, 1 in 2; citrate of iron and ammonia, 1 in 2; sodium salicylate, 1 in 2; ammonium chloride, 1 in 4; ammonium bromide, 1 in 4; quinine sulphate, 1 in 10; by the aid of a sufficiency of dilute sulphuric acid.

Never in any of the above do I find any trace of fungoid growth, even though occasionally I have had a solution by me, in the varying temperatures of summer and winter, for months. In speaking of solutions I will refer to two mixtures which are

of equal convenience, viz., powdered rhubarb and aromatic powder of chalk, both of which I keep ready rubbed down with chloroform water (1 in 8), so that the time and trouble required in dispensing these in mixtures may not have to be expended a dozen times an hour. Mucilage of acacia made with chloroform water keeps indefinitely.

Hitherto there can be no drawback to the use of chloroform water as a preservative, for the addition of one or two drachms, or even one or two ounces, to a mixture cannot have any injurious effect on the patient. All the medical men for whom I dispense are aware of my practice, and none of them make any objection whatever.

The second class of substances I preserve with chloroform is infusions, either B.P. strength or concentrated one to three. Those with which I have experience are quassia, both single and concentrated; gentian (strength as B.P., but without orange and lemon), single and concentrated; senega, single and concentrated; cascarilla, single and concentrated; and calumba, buchu and orange in the concentrated strength only. I find the preservative action of chloroform is perfect in all these when concentrated, the chloroform being added to the strained infusion in the proportion of 1 dram (fluid) to each 40 fluid ounces and dissolved by agitation. The aroma of these preparations when diluted is much more like the fresh infusion than any concentrated one to seven preparations (of wholesale house manufacture) I have used, and in no case does the chloroform cause any deposit, an advantage over alcohol when the infusion contains any mucilaginous matter. Some practitioners object to the use of concentrated infusions preserved with alcohol on this very account. With the infusions made single strength (*i.e.*, B.P.), chloroform in a less proportion than $\frac{1}{2}$ a drachm to 40 ounces will not keep them at all, except in the case of perhaps cascarilla, and if they are required to be kept more than a week, they require rather more than that unless alcohol be added as well. For instance $\frac{1}{2}$ an ounce of chloroform (dissolved by agitation) will not keep 2 gallons of infusion of senega good for seven days, but the same quantity with 2 ounces of tincture of senega will keep the same infusion a fortnight at least. From these experiences I infer that when chloroform is employed as a preservative the liquid must be nearly saturated with it, otherwise it will not preserve for any great length of time. In the case of single strength infusions this is a disadvantage, as it will be seen at once that a dose of 1 or 2 ounces (if saturated

with chloroform) contains from 2 to 5 minims of chloroform, which of course is inadmissible, as it becomes a medicinal, if not an injurious dose. In some instances (I have not tried it in all) the chloroform may remain undissolved at the bottom of the bottle, where it exerts its preservative influence (as, *e.g.*, in the case of solutions of citrate and acetate of potassium), but care must be taken not to pour it out when the bottom of the bottle is reached or neared.

In this paper I have but reviewed my experience of the subject in those instances where I constantly employ it. Time has not permitted me to make experiments by way of testing its efficacy with other substances. For keeping solutions and concentrated infusions, chloroform seems to me to be all that can be desired.

CHLOROFORM AND CHLOROFORM WATER AS PRESERVATIVES.

BY HAROLD WYATT, JUNR.,

Pharmaceutical Chemist.

Since the publication of the "Additions to the B.P. of 1867" in 1874 we have had rather an extended experience in the use of chloroform and chloroform water in preserving pharmacal preparations of an aqueous nature, such as infusions and solutions of inorganic and organic salts, resulting in our daily widening the range of their application.

In hospital dispensing, where it has been necessary to keep large quantities of stock mixtures and solutions, we have used chloroform water instead of water in the mixtures, and in the proportion of 1 in 4 in the solutions where the substance was an ordinary inorganic salt dissolved in water; quinine, morphine and other alkaloid salts were simply dissolved in the chloroform water. We find these mixtures and solutions remain clear and devoid of fungoid growths under conditions which would necessitate the use of at least 25 per cent. of proof spirit for their proper preservation.

An instance of the action of chloroform in this respect may be cited in illustration, *viz.*, an extract of ergot mixture containing solution of strychnine was largely prescribed, and consequently we had no alternative but to keep it concentrated, though we could foresee it was about as bad a specimen of a mixture to keep free from change as we could well have chosen.

Without chloroform it became in about four days covered over with mould on the surface, and developed a strong trimethylamine odour.

When chloroform water was used there was no sign of change after three months of hot weather.

Alkaloid salts keep very well in chloroform water solution; we have tried in this way morphine, quinine, strychnine and cocaine, and have not had a failure so far, and can agree with Mr. H. W. Jones, F.C.S., who states in a paper in the *Chemist and Druggist* of June 21, 1890, on "Permanent Hypodermic Solutions," that "chloroform water is the simplest and best of all preservatives."

Fruit juices keep very well with chloroform added in the proportion of 1 part in 600, the aroma being rather improved than otherwise by the addition; at any rate it has seemed so to us with the juices we have so far tried, viz., raspberry, lemon, and blackberry.

The specimen of raspberry juice sent with these "notes" was prepared by allowing the fruit to stand in a lightly covered jar for about a week, during which time a slight fermentation was set up, the fruit bursting and the solid portion rising to the top, leaving the juice nearly clear beneath, the aroma at the same time seeming to improve.

This juice was syphoned off, run through flannel, chloroform added in the proportion of 1 in 600, and the whole shaken. Nothing further has been done with it since it was finished off in July, 1886, the condition of the specimen well showing the value of chloroform as a preservative in such cases.

In the *Year-Book* for 1888, page 30, I saw an extract from a paper by E. Salkowski, who asserts that chloroform water acts very strongly on micro-organisms but not at all on non-organized ferments, and who consequently advocates its use instead of that of glycerine in making pepsine preparations.

I have made use of this suggestion since, when preparing essence of rennet, with great success, the rennet never acquiring the slightest unpleasant odour, and being when finished really a "sweet essence."

Recently, having to keep some cucumber juice for a time before using, I tried preserving it by the addition of a fourth of glycerine, but to no purpose, for it soon became acid and spoilt.

Then with another lot I used glycerine in the same proportion and chloroform one part in 600, and there was not the least appearance of change.

Chloroform water I have used with the sanction of, and with satisfaction to, the medical staff of a hospital, in making a solution of opium which was largely used as an external application, and in which spirit was not desired.

The PRESIDENT having moved a vote of thanks to the authors, said these papers were very useful. Chloroform was a very valuable preservative, but it would have to be employed only with the sanction of medical men. He was quite sure if it were introduced to the profession as a preservative and approved, it might lead to a great decrease in the amount of alcohol used, which was very desirable, especially as the duty upon it was increasing every year.

Mr. GROVES said his experience of chloroform as a preservative extended over many years, but he had not made any careful and systematic experiments upon it. It was very useful in preserving mucilage and certain unstable syrups which were liable to ferment, and he had also used it in certain hypodermic injections of morphia, and so on; but in such cases only with the sanction of the prescriber. He should study the papers carefully, because he was quite satisfied that some day the use of chloroform would be very greatly extended. One great advantage in connection with it was that if its presence were undesirable it could be very easily dissipated when the medicine was dispensed, by warming it very slightly.

Mr. LINFORD said he had had some little experience of the use of chloroform water, and agreed mainly with the statements of the authors that it preserved mixtures very well, especially in the case of acids with an organic base, where there was a tendency to favour a vegetable growth. It was an especially admirable preservative of the citrates. He had lately been using chloroform in another form, and with success. Those who made concentrated infusion of roses knew the difficulty there was to prevent it becoming mouldy at the top, and getting into a pectinous condition. In order to prevent that he put in a large bottle, and suspended in the neck a piece of cotton wool saturated with chloroform, and then corked it tightly. The infusion might be kept then for months without being mouldy or pectinous. The same plan might be followed with many substances, the action simply consisting of preventing the access of germs, or killing them on their way. Some recommended putting chloroform into bottles

with fruit and bottling them simply with the vapour of chloroform in them. He had tested that with some damsons, introducing 20 up to 60 minims of chloroform in various bottles. The whole of them kept perfectly well, and when cooked there was no flavour of chloroform about them. Of course it was necessary that the bottle should be carefully corked down.

Dr. SYMES thought the authors had pretty well exhausted all that was to be said on this subject. It was certainly not desirable to use chloroform in place of alcohol without the sanction of the medical man, and even if his sanction were obtained, the prescription might be taken somewhere else, where it might be dispensed with spirit, and it was always undesirable to have the same prescription sent out differently by different chemists. Some years ago, when he was more in the habit of making fluid extracts by percolation, using a large quantity of fluid, he found it very useful to add a little chloroform to that large bulk while waiting its time for evaporation. The chloroform was dissipated in the process of evaporation, and there was no difficulty in the matter; but using pressure more now he did not require to use chloroform as formerly. He could support the statement made by Mr. Wyatt that it was exceedingly good for preserving essence of rennet.

Mr. GERRARD said as a hospital dispenser he had for five or six years past used chloroform as an anti-ferment, especially with infusion of quassia, which was very prone indeed to decomposition, and sometimes in twenty-four hours would become worthless. He made it eight times the strength usually laid down, and added to it the proper proportion of chloroform for preservation. He also prepared an emulsion of chloroform made after a method suggested by Mr. Collier, viz., adding one part of water to six of chloroform, and a few drops of tincture of senega, then shaking it; the chloroform divided extremely fine and formed an emulsion; this was available for solution in an infusion easily. It was simply necessary to shake up the chloroform into an emulsion, pour in a measured quantity, stir it, and the chloroform went into solution immediately. One of the authors mentioned the use of chloroform in connection with solution of citric acid and sodium salicylate (1 in 2); these he kept constantly in stock, but never found any decomposition take place in such strong solutions, and should be surprised to find that sodium salicylate in a solution of 1 in 2 would undergo decomposition, even if kept for two years, unless it were exposed to very improper conditions. He also used it as

a preservative of infusion of meat juice. In hospital practice it was customary to give peptones and fluid foods of this character, and it was desirable to preserve the meat juice for a few days, as it was not always convenient to prepare it at the moment. If the meat were carefully cut up, and the juice expressed, and a certain proportion of chloroform added and shaken up well, it would keep for several weeks. After keeping about a month, however, the meat juice underwent some changes. He also used chloroform as a preservative for other peptones, which ought never to be preserved by the addition of alcohol, because there was great difficulty in getting rid of it, and apart from the expense, the presence of alcohol would prevent the absorption of the peptone by the parts with which it came in contact. Alcohol, therefore, should not be used for this purpose, but chloroform might. Whenever he mentioned this subject to medical men, he always found it met with their ready approbation, and they were only too glad to know that there was such a substance at their disposal.

Mr. COLLIER said he could corroborate all Mr. Gerrard had said. At the hospital where he was employed he had used chloroform for a number of years, and recommended it to medical men, especially in cases where it was necessary to give medicine to out-patients to be taken several days in succession. The physicians used preparations of ergot to a considerable extent, which soon decomposed unless preserved in this manner. One objection, however, to the use of chloroform was the special dislike which certain individuals had to it, so that it could hardly be recommended for universal adoption. Some persons could not bear to take it, just the same as some could not tolerate peppermint.

Mr. CRIPPS said there was one point which had not been adverted to, and that was that chloroform was liable in the light to undergo decomposition, whereby hydrochloric acid and very acrid vapours were produced. They knew also that chloroform water possessed that property in an exalted degree, therefore it was most important that any one using this should keep the preparations in the dark. Some members might be able to give their experience on this matter, and say whether infusions preserved by chloroform became spoilt on account of the production of irritating vapours.

Mr. MARTINDALE said he had tried preserving fruits with chloroform, but not with great success. The fruit was preserved very well, but when it was made into pies it could scarcely be eaten. The chloroform was not dissipated even when the fruits were

cooked. It was very useful for preserving many decoctions and infusions which had to be set aside for evaporation, but it was better to dilute the chloroform with double its volume of rectified spirit if it had to be mixed with an aqueous fluid; it acted in that way much more satisfactorily, he thought, than by emulsification.

Mr. NAYLOR said he had been much surprised by the remark made by Mr. Cripps, which was quite contrary to his own experience, and should be glad if that gentleman, or any one else, could throw any light on the subject by referring to any experiments in confirmation of his statement that chloroform water was an extremely unstable body. That chloroform was liable to decomposition more quickly when in aqueous solution than chloroform itself was quite contrary to his own idea.

Mr. SIEBOLD fully endorsed the remarks of Mr. Naylor. Though chloroform, when free from alcohol, was liable to decomposition on prolonged exposure to light, chloroform water, according to his experience, was a very stable preparation.

Mr. CRIPPS said he was aware that a small quantity of alcohol would preserve chloroform. He could not give any definite chemical experiments, of his own or of others, in support of his statements; on the other hand, he could not recall any which proved that chloroform water was more stable than chloroform. But he had met with chloroform water which had become acid, and had heard from several pharmacists that such was the case.

Mr. BRANSON said he had found chloroform very useful as a preservative for the reagent solution of starch.

The PRESIDENT said some experiments on this subject were made fifteen years ago by Professor Attfield. He thought Mr. Cripps must have forgotten what was then said. He had reason to believe that a great cause of the reaction he observed was the impurity of the iodine. In the presence of acid iodine combined with quinine, and a slight acidity in the chloroform water reacted on the iodate and iodide.

Mr. GROVES said one useful application of chloroform in preserving organic matters was afforded by lemon peel. In making syrup of lemons there was often an excess of peel, which was commonly thrown away, but that might be preserved by putting it in a stoppered bottle and pouring in chloroform. The stopper should be smeared with honey, not fat.

Mr. MARTINDALE remarked that the action of chloroform in this way appeared to be inhibitory, not germicidal, as the moment a fluid which had been preserved perfectly was heated and the

chloroform evaporated, the germs present, but hitherto inactive, would set up a fungoid growth. The chloroform appeared to act as an anæsthetic to the germs.

Mr. ABRAHAM also bore testimony to the advantage of using chloroform to preserve fluids in the process of dialysing.

Mr. GERRARD said there was another direction in which chloroform was much used as a preservative, viz., in physiological laboratories, for the preservation of urine and post mortem fluids.

Mr. PARKINSON asked whether chloroform would preserve mucilage, such as gum arabic, for if so it would be most valuable. It was very annoying to have mucilage going rancid in a short time. He had great doubts whether medical men would sanction its general use.

Mr. NAYLOR said that Mr. Burnett had stated in his paper that mucilage of acacia made with chloroform water kept indefinitely, and he could quite confirm that statement from his own experience.

The next paper read was

ON GLYCERINE.

By J. LEWKOWITSCH, PH.D.

At the outset, I wish to disclaim any intention on my part of bringing anything new before you. But having been asked to say something about glycerine, with the manufacture of which I am connected, I thought I might perhaps supplement the remarks made last year by Mr. Siebold and several other gentlemen, in the discussion following Mr. Siebold's paper.

This will be done mostly from the manufacturer's point of view, as manufacturing processes cannot be supposed to be generally known, and it is not at all unlikely that erroneous opinions may be current amongst those not conversant with practical processes used in chemical works.

During the last year it has been repeatedly stated that some samples of glycerine destined for pharmaceutical purposes contained arsenic, a fact which was not unknown to manufacturers, but on which, for very obvious reasons, they did not care to enlighten the consumers. The arsenic in the glycerine owes its existence only to the arsenic contained in the reagents used in the manufacturing process. It has been pointed out by several gentle-

men in last year's discussion, that glycerine purified by distillation would not be contaminated by this poisonous substance; although it is but fair to say that Mr. Allen had some doubts about it, still, in the concluding remarks it was distinctly stated that arsenic could be removed by distillation.

This is not so, as the simple fact will show that nowadays all glycerine for pharmaceutical purposes is distilled, nay, even double distilled, glycerine. The times when glycerine was being prepared by other processes of refining have gone by, and a glycerine which had not been purified by steam distillation would be unsaleable for pharmaceutical purposes.

But to remove every doubt I prepared the substance formed when arsenious acid is dissolved in glycerine, a substance which has been described by Schiff, and later on by Jackson, who apparently overlooked the earlier publication of Schiff. This substance is the arsenious ether of glycerine, $\text{As O}_3 (\text{C}_3 \text{H}_5)$. On being heated to 250°C . it decomposes, while arseniuretted hydrogen and other volatile arsenious compounds distil over. At the same temperature glycerine distils also over, and it is quite evident therefore that any arsenic contained in glycerine will distil along with it. The experiments which I carried out could not show any other result.

Arsenic contained in glycerine cannot be removed by distillation, and to my knowledge there is no process known for completely freeing glycerine from arsenic on a practical scale.

Pure glycerine, free from arsenic, can therefore be obtained from such sources only where reagents not contaminated with arsenic are being used. As it has been suggested last year that glycerine emanating from certain processes ought to be rigorously excluded by the Pharmacopœia, I may be allowed here to very briefly review from our point of view the processes used for manufacturing glycerine. The raw materials are exclusively fats and oils which yield on saponification or hydrolysis the glycerine as a by-product.

Glycerine free from arsenic will be obtained in those processes where the fats are hydrolysed by means of water, whether it be used in the liquid state, under high pressure, or as superheated steam. The lime saponification, which is yet largely practised, especially in smaller works, will, as a rule, also yield an arsenic-free glycerine. On the contrary, all glycerine coming from works where the sulphuric acid saponification is practised, will contain arsenic, as the glycerine will extract all the arsenic from the sul-

phuric acid. There is, however, no doubt that even such glycerine would be pure, as far as arsenic is concerned, if sulphuric acid free from arsenic were used, as it may be prepared from the sulphur obtained by Chance's process.

There is consequently no doubt that there are sources from which one may easily obtain a pure glycerine. With a view to ascertain whether there are in commerce samples of glycerine absolutely free from arsenic—for in many works several processes are simultaneously used, and the glycerine will be mixed in the end—I examined ten samples of glycerine coming from ten different works. As I wished to detect smallest traces, I used silver nitrate instead of mercuric bichloride. Three of the samples would have to be rejected, four samples contained very small traces, which might be disregarded, while three only were absolutely free from arsenic.

There is still another process for saponifying fats, and consequently manufacturing glycerine, practised on a very large scale indeed, that which yields the soap-lye glycerine. At last year's Conference the glycerine derived from that source was very badly treated, and it was demanded that soap-lye glycerine ought to be entirely excluded from pharmacy. Unnecessary precaution!—up till now at least; for no chemically pure glycerine has been prepared hitherto from soap-leys, owing to the difficulties incident to the purification of it.

Being wishful to prove here that soap-lye glycerine has a far worse reputation than it—or let me say some of it—deserves, I undertook during the last few weeks to prepare chemically pure glycerine from soap-leys, not in the laboratory, but on a large scale, in the works. I had to use such glycerine as I just had at hand, and as this contained, owing to the impure reagents, some arsenic, I had on starting to expect a glycerine containing traces of arsenic; but this is, from reasons pointed out above, only of secondary importance, as on repeating the manufacture of it, I shall have to start with purer reagents, and the real difficulties are lying in quite another direction.

Arsenic, although the most objectionable impurity, is, however, not the only one which may be found in “chemically pure” glycerine. As the British Pharmacopœia treats glycerine somewhat cursorily, I may be allowed to point out here one or two tests which will perhaps be found useful.

The glycerine may contain organic impurities, either fatty acids, etc., or so-called polyglycerols, under which name I may sum-

marise all those substances having a higher boiling point than glycerine itself. The way to test for the latter is to gently evaporate a known quantity of glycerine in a platinum dish at a temperature of 160°C . The residue left, from which the ash, subsequently found on incineration, has to be deducted, will give a fair indication as to the care with which the glycerine has been distilled.

The following table gives the residues for eight "chemically pure" glycerines, arranged according to the quantity of organic residue, to which I have added the analysis of the soap-lye glycerine:—

	Organic Residue.	Ash.
1 . . .	0.0243 per cent.	0.00603 per cent.
2 . . .	0.0327 „	0.0050 „
3 (a) . .	0.0328 „	0.0140 „
(b) . .	0.0267 „	0.0102 „
4 . . .	0.0360 „	0.0138 „
5 . . .	0.0371 „	0.0081 „
6 . . .	0.0443 „	0.0066 „
7 . . .	0.0738 „	0.014 „
8 . . .	0.0751 „	0.0154 „
9 . . .	0.0931 „	0.0305 „

No. 3. represents the figures found for two batches of the soap-lye glycerine, which I have shown.

Fatty acids, as butyric acid, etc., and other organic impurities, will be easily detected by testing with ammoniacal silver nitrate at ordinary temperature, which is recommended by the German Pharmacopœia. It is required of a good glycerine that it should not reduce the silver within fifteen minutes. This test is far more delicate than that in which silver nitrate alone is used, as the manufacturers of cosmetics do, who reject any glycerine which reduces silver nitrate in less than twenty-four hours. I think that the test with ammoniacal silver nitrate is a little too rigorous, as ammoniacal silver nitrate is easily reduced by glycerine at an elevated temperature; in fact, of all the glycerine samples I examined, there were only two (Continental ones) which fairly responded to this test, while all others would have to be rejected. Testing with nitrate of silver alone would perhaps be sufficient to show whether there are any silver nitrate reducing substances in the glycerine.

Under No. 68 of the blue list an answer is requested to the question how to estimate glycerol in pharmaceutical preparations.

I am afraid there is no satisfactory answer to that question, as we are not yet in possession of sufficient quantitative material. Lately, two methods have been proposed for the estimation of glycerol, which seem specially suitable in a great many cases, unhappily not in all. The first method, based on oxidation of glycerol to oxalic acid, can only be of use where no other organic substance is present which might yield oxalic acid. The glycerol in *glycerinum aluminis* might be thus estimated. The second method—boiling of glycerol with acetic anhydride and sodium acetate—requires highly concentrated solutions, and would, of course, be completely useless when other substances are present which combine with acetic anhydride, as would be the case with *e.g.*, *glycerinum acidi carbolici*, or *glycerinum acidi gallici* and *glycerinum acidi tannici*. For such preparations it would be required to have a method for completely transforming the glycerol into a weighable substance, *e.g.*, a tribromine derivative.

Mr. SIEBOLD said, before reading the short note which he had prepared, he wished to make a few remarks by way of preface. He was not aware that anyone in last year's discussion had made any positive assertion to the effect that distillation removed arsenic from glycerine; it was simply an opinion he then expressed, to that effect, and which he had since found to be erroneous, as would be seen from his present paper. As to anything like a sweeping condemnation of the glycerine of soap works, he felt sure that nothing of the kind occurred in last year's discussion. It was the general presence of arsenic in such glycerine that was objected to as an impurity rendering the preparation unsuitable for medicinal purposes. There would be no prejudice whatever against glycerine from that or any source, if the product only answered all just expectations as regards purity. If soap-makers in the preparation of their glycerine would abandon the use of impure acids, and instead, employ acids free from arsenic, this objectionable impurity would, as a matter of course, no longer occur in their product.

Mr. SIEBOLD then read the following—

NOTE ON THE PURIFICATION OF GLYCERINE.

BY LOUIS SIEBOLD, F.I.C., F.C.S.

It has been pointed out before that glycerine obtained as a by-product in the manufacture of soap is always more or less contaminated with arsenic, which emanates from the acids used in the process. Having convinced myself that re-distillation of the glycerine, even if several times repeated, does not remove this impurity, I made a number of experiments with the object of ascertaining whether the purification can be effected in a simple and inexpensive manner, such as would adapt itself to the purposes of the manufacturer. I will not trouble this meeting with a record of unsuccessful experiments, but will confine myself to a description of a simple process answering all requirements. It is based on the well-known property of freshly precipitated ferric hydrate to remove arsenious acid from solutions by converting it into an insoluble compound. The ferric hydrate, after being well washed so as to remove all soluble salts, is added to the glycerine previously diluted with about half its volume of water. The mixture is digested at a slightly elevated temperature with frequent stirring, after which it is allowed to stand till the next day, during which time it is occasionally agitated. It is then filtered and evaporated to the required specific gravity. I found the mixture to filter much quicker than I expected. The product is perfectly colourless and free from arsenic and iron, and also free from sulphur compounds. The glycerine I experimented with was a distilled preparation, sold as pure, though it contained appreciable quantities of arsenic and traces of sulphur compounds. The process involves very little trouble, and is as easily carried out on a large scale as it is in laboratory experiments.

I may add that the complete removal of arsenic and of sulphur compounds from glycerine may also be effected by a suitable treatment with potassium permanganate; but as this process involves the necessity of subsequent distillation, it appears to me more troublesome than the other.

The PRESIDENT said he would ask Mr. Siebold to read what took place in the course of the discussion on this subject last year.

Dr. SYMES said that since Mr. Siebold first brought forward this matter, the attention of manufacturers of glycerine had been directed to the small traces of arsenic which were found in what was assumed to be pure glycerine, and he had had some experience of the results. Mr. Siebold said the process of treating glycerine with oxide of iron removed the arsenic without leaving a trace of iron, but he should like to ask him if he had really tested carefully for traces of iron. As a matter of fact he had had some difficulty with a quantity of glycerine which, when taken from the carboys in which it was imported, was bright, colourless, and free from arsenic. It was tested for arsenic, but when placed in a glass bottle and allowed to remain for a week or two, it gradually became slightly opalescent, and showed signs of colour, and on examining it carefully it was found to contain traces of oxide of iron.

Mr. CONROY said this was a very important subject. Since Mr. Siebold had pointed out the presence of arsenic in glycerine, most firms had been on the alert, and had been very exacting—and rightly so—as to the quality of glycerine, and wholesale dealers had had considerable trouble and anxiety in seeing that what they sold was free from arsenic. It was a difficult matter to obtain commercial glycerine, except one particular make, which he should not mention, which was absolutely free from arsenic. He had known instances in which the manufacturer guaranteed glycerine to be free from arsenic when made from soap lees, but it was found to contain a considerable quantity on applying Mr. Siebold's test. Then the manufacturers endeavoured to tie them down to what they thought a less exacting test, viz., Marsh's. He must say he preferred that test himself, and the manufacturers preferred it. With reference to what had been said by Mr. Symes as to the presence of iron in glycerine, he thought at one time that it was due to the drums in which the glycerine was imported, but Mr. Siebold had thrown considerable light upon it now. In manufacturing glycerine of tannic acid, he found it gave a colour which appeared to indicate iron, and on testing it that was found to be so. He had very little doubt this was due to the treatment suggested by Mr. Siebold. At the same time the treatment was very ingenious, and he was sure manufacturers would be thankful to Mr. Siebold for it; but the glycerine should be carefully distilled to free it from iron.

Mr. ABRAHAM said Dr. Symes had stated that the glycerine appeared to be pure, but he should like to know whether it

was really so. The fact of its simply being clear was hardly sufficient proof.

Dr. SYMES said it would have been "pure glycerine," but as it contained iron, of course he must qualify the term. To show that the iron was not derived from the drums, he communicated with the manufacturers in Germany, who admitted they had used an iron process for removing traces of arsenic.

Mr. G. WARD said he had noticed the coloration of glycerine referred to by Mr. Conroy in dissolving tannic acid. His own impression was that in this case the discoloration was due to the action of the glycerine on the drums in which it was imported. He never found glycerine imported in tins and kept in the same vessels act in that way on tannic acid, but glycerine coming over in iron drums, and kept therein for any length of time, was very apt to be contaminated with iron. He had not the slightest doubt that glycerine acted on iron as a solvent, and it would not be fair to say, if iron were found in glycerine, that it was due to the glycerine having been treated by this oxide of iron process. He had had some correspondence with manufacturers of glycerine abroad, who told him that it was not intended that the glycerine should be kept in the drum, but should be emptied as soon as possible, and they admitted that the glycerine would act on the iron.

Mr. CONROY suggested that if the glycerine acted on the iron of the drum, it would most probably act on the hydrate of iron.

Mr. SIEBOLD, having quoted the exact remarks made last year by himself on the subject, said the opinion he then expressed with regard to the possibility of removing arsenic by re-distillation was certainly incorrect, as he had convinced himself by subsequent experiments. With regard to the question now raised by some of the speakers, as to whether his process of purifying glycerine by means of ferric hydrate would not cause a contamination with iron, and whether he had tested his product for that impurity, he had to say that he certainly tested it and failed to obtain any indication of iron by ammonium sulphide. More sensitive tests than this he had not applied, nor was there, in his opinion, any occasion for so doing, as any such minute trace of iron that might escape observation by this test could be of no consequence, and was certainly devoid of the significance attaching to the presence of arsenic. He did not consider distillation of the glycerine after the treatment with iron as at all necessary; but even if it were, he was of opinion that the process would still

commend itself to the attention of the manufacturer. However, he had no reason whatever for believing that pure glycerine would exercise any solvent action on ferric hydrate; indeed, his own experiments pointed quite to the contrary. His process, being only now introduced, could under no circumstances be the cause of the occurrence of iron in some commercial glycerines to which allusion had been made. He had not studied the action of impure commercial glycerines on tinned iron bottles, but he was quite aware that iron was a common impurity in such qualities, and considered it likely that glycerines of that description might act as a solvent upon iron. His own experiments in connection with this paper had been confined to the removal of arsenic from an otherwise pure glycerine.

Mr. BRANSON said it occurred to him that the action or non-action of glycerine on iron, or ferric hydrate, might be due to the presence or absence of fatty acids in the glycerine.

Mr. SIEBOLD said that the glycerine he worked with was perfectly colourless and very pure, except that it contained traces of arsenic and of sulphur compounds. It was quite fit for toilet purposes, and was certainly free from fatty acids. Glycerine containing such acids might easily dissolve iron, but the solvent action in that case would not be due to the glycerine but to the impurities. His own observations certainly led to the conclusion that pure glycerine had no such action.

The PRESIDENT asked Dr. Lewkowitsch if he should recommend that in the Pharmacopœia the specific gravity of 1·250 be adhered to, or whether it should be raised to 1·260, which was now the recognised specific gravity of commercial glycerine. The pharmaceutical standard was put very low some years ago, but he saw no reason now why the official glycerine should not be made to coincide with the glycerine of trade.

Dr. LEWKOWITSCH thought the trade could very well supply glycerine at 1·260 chemically pure for pharmaceutical purposes. Some of those samples he had prepared were 1·263, and one 1·264, but one did not care to go beyond 1·260, because the glycerine generally got decolorised, and had to be refined; and as in the filtering process, and so on, it would take up a little moisture from the air, and lose a point or two, 1·260 would be a fair specific gravity to fix. He did not desire to go into manufacturing processes, partly because he was a manufacturer, and partly because it would not interest the meeting. What they wished to obtain was a pure article. There were differences in different works,

and one outside the particular works did not know the details of the process. They could judge of the excellence of the product, but how it was being made nobody knew, and nobody ought to know. With regard to the solvent action on iron oxide, it must be remembered that glycerine was one of the best solvent substances known, combining the solvent action of water and alcohol together; it dissolved almost everything, and that it dissolved iron pretty easily was hardly a thing to be astonished at. If pure glycerine were treated with charcoal which contained a little iron oxide, it would extract the iron oxide out of it just as it removed arsenic from sulphuric acid or hydrochloric acid. How to free glycerine from arsenic in a pharmaceutical laboratory was a question which he did not think worth considering, because however cheaply it might be done, there were sources of pure glycerine to which they ought to adhere. The treatment with permanganate of potash was rather an exploded idea. It was recommended as a universal elixir, and treated as a secret, six years ago. He did not see that it was necessary for pharmacists to undertake the purification, as the trade could very well supply them with all they wanted. He hardly thought that the presence of iron in glycerine was owing to the action on the drums. When being filled into the drums it was in a cold state, and was such a viscous liquid that it would not dissolve iron. Years ago he made some experiments on this point, and did not find that glycerine dissolved iron from the drums. It was glycerine in the hot state, partly diluted, which dissolved out from the vessels, etc., or even from charcoal, oxide of iron. He believed it would be impossible to find any glycerine absolutely without any trace of ash.

The PRESIDENT, in conveying the thanks of the Conference to the authors, said it was evident further examination was needed, and the charcoal seemed to be the next thing to watch.

A note was then read entitled—

ANTIDOTES TO STRYCHNINE.

BY LOUIS SIEBOLD, F.I.C., F.C.S.

A short time ago I became acquainted with the details of a case of accidental poisoning, in which a large dessert-spoonful (certainly not less than $2\frac{1}{2}$ fluid drachms) of the official 1 per cent.

solution of strychnine had been taken by mistake in place of a dose of medicine. The mistake being discovered at once, a large dose of tannin was administered without delay, and this was followed within a few minutes by the administration of about one ounce of charcoal, after various attempts to produce immediate vomiting had failed. Medical assistance was not available for another half-hour, by which time the tetanic spasms were fully developed. They became so violent as to justify the conclusion that the physiological action of the entire quantity of the poison taken was produced, and that the antidotes had been without any effect. When medical assistance arrived, the severity of the spasms was such as to prevent the administration of chloral hydrate and potassium bromide, which was attempted; and it was not until a subcutaneous injection of morphine and the inhalation of chloroform had somewhat allayed the spasms, that these remedies could be administered. Under the combined influence of these narcotics, the symptoms soon lessened, and in the course of a few hours they practically disappeared. I may add that the narcotics, though stopping the twitchings, were so far counteracted by the poison that they produced no sleep. The patient felt quite well the next day, and had nothing to complain of but muscular soreness and pain—the after-effect of the violent contractions.

The total failure of the chemical antidotes in this instance induced me to perform a number of experiments in order to further test their value, if any, as antidotes to strychnine. The employment of both animal charcoal and tannin as antidotes to poisonous alkaloids is based on their power of rendering these bodies insoluble. I found, however, that a solution of two grains of strychnine in six ounces of water forms no precipitate on the addition of tannin. Animal charcoal, if kept in intimate contact with a similarly weak solution of strychnine by frequent agitation for some time, was found to effect a nearly complete precipitation of the alkaloid; but its action was very imperfect indeed, when frequent agitation was not resorted to. The following physiological experiments were tried on myself under strictly equal conditions, and at intervals of one week. Having first ascertained in several trials that fifteen drops of a 1 per cent. solution of strychnine represented the smallest dose which could be depended upon in my case to produce slight but distinct symptoms, if taken on an empty stomach, that dose was adopted in my experiments with antidotes. The results were as follows:—

The administration of 10 grains of tannin immediately after the

dose of strychnine did not interfere in the slightest degree with the action of the latter.

The administration of a large dose of animal charcoal (1 ounce) immediately after the strychnine seemed to have the effect of rendering the symptoms less distinct; but although slight they were still noticeable. A similar dose of charcoal administered twenty minutes after the strychnine appeared to have no effect whatever.

Thirty grains of chloral hydrate taken immediately after the strychnine prevented the effect of the latter entirely, but failed to produce its usual hypnotic action. In another experiment the same dose of chloral, taken half an hour after the strychnine, did not entirely prevent the symptoms; but they disappeared very soon afterwards. The chloral in this case had its usual effect in producing sleep.

Injections of morphine and the administration of potassium bromide were not tried.

It will not do, of course, to conclude too much from experiments such as these; but, taken in conjunction with the chemical experiments above described, and with the results in the poisoning case referred to, they appear to me to establish the uselessness of tannin and the doubtful value of charcoal as antidotes to strychnine in cases of actual poisoning. The latter, being perfectly harmless, even in very large doses, might still be attempted, if immediately at hand; but it is the physiological antidotes, and, pre-eminently the narcotics, on which medical men will have mainly to rely in the treatment of cases of poisoning by strychnine. To produce vomiting will of course be the first thing to be attempted; but, unless this can be done within a very short time after the administration of the poison, it is useless, as the strychnine will be already absorbed.

Mr. LINFORD said in cases of poisoning by strychnine it might sometimes happen that no medical man was within reach, and probably no such thing as hydrate of chloral or morphia. Some years ago he saw a case of that kind, in which a boy at a farmhouse had accidentally swallowed some strychnine. How much was not known, but it was some which had been procured for poisoning rats. He happened to be there a few minutes afterwards, and was applied to directly as to what could possibly be done. Looking only at the extremely opposite effects of

tobacco and strychnine, he put a pinch of about 6 or 8 grains of tobacco in hot water, and gave the boy an injection ; he had no strychnine rigors, and in fact took no harm from it. He always said that should such a case occur again the first remedy he should fly to as an antidote to strychnine was tobacco. He had also seen the action of tobacco some time ago in a very bad case of pain from the passage of gallstone, where the limbs had become contracted with pain to a distressing extent. An injection of tobacco relieved the pain in less than ten minutes. He thought the medicinal use of tobacco was not sufficiently known.

Mr. GROVES said some years ago he saved the life of a valuable dog by giving him chloral, and sent a short account of it at the time to the Journal. Of course with regard to chemical antidotes, in the way of absorbents or precipitants, it was no use to administer them after the poison had been absorbed ; physiological remedies must then be adopted. It had occurred to him to suggest to Mr. Siebold as a precipitant of the alkaloid, if taken in time, the iodobismuthates might be tried, as they were precipitants of all alkaloids. The best precipitant of alkaloids was the iodo-mercurate, but that of course was inadmissible.

Mr. GERRARD said there were occasionally cases of poisoning in the metropolitan hospitals, and he remembered one case which happened. The charwoman found out where the simple syrup was kept, and on leaving one night took a dose of what she supposed to be simple syrup, but which turned out to be Easton's syrup, and the special symptoms of strychnine poisoning immediately set in. She had just strength enough to walk out into the corridor, where she fell on her back with all the most marked symptoms of strychnine poisoning. In that case, where the effects of the poisoning were somewhat advanced, it was impossible to administer emetics, but she was treated physiologically by means of paralyzing agents, and he should say it was always the practice to treat these cases with a physiological antidote, generally opium. It was very rare to administer tannic acid as a remedy. Occasionally animal or vegetable charcoal was used, but rarely tannic acid. An emetic might be administered with good effect if it could be done immediately. He knew an instance of a student who, when handling crystals of strychnine, picked one up and put it in his mouth. This was noticed by a fellow-student, and a dose of sulphate of zinc was immediately given him, and there was not the slightest symptom of strychnine poisoning. Where the symptoms have developed themselves, however, recourse must be

had to [physiological antidotes, such as had been mentioned by Mr. Siebold, and this had often been done successfully.

The next paper read was a—

NOTE ON A COMPOUND OF CAFFEINE WITH MERCURIC CHLORIDE.

BY ROBERT H. DAVIES, F.I.C., F.C.S.

Some time ago I observed that a solution of corrosive sublimate, added to a solution of caffeine in water, caused the production of a crystalline precipitate, and as I did not find the fact recorded in the text-books, it seemed desirable to investigate how far the reaction would serve as a test for the presence of caffeine. The existence of such a compound is mentioned in Watts' "Dictionary of Chemistry," 1st edition, vol. i. p. 709, where "chloro-mercurate of caffeine" is described as being "obtained by mixing an alcoholic solution of caffeine with excess of mercuric chloride."

I find that an aqueous solution containing 1 of alkaloid in 200 gives an abundant precipitate immediately with saturated solution of mercuric chloride.

With 1 of alkaloid in 1000 of solution some crystals appear a few minutes after adding an equal volume of mercury solution, and in an hour or so the crop of large acicular crystals is abundant.

With more dilute solutions a greater length of time is necessary; crystals are formed in a few days in solutions containing so little as 1 of alkaloid in 4000 of solution.

The compound formed is much more soluble in water than in excess of the mercurial salt; on this account it is desirable to use a saturated solution of the reagent, or nearly so, and to add about an equal volume to that of the caffeine solution to be tested. The solubility of the compound in water at 17° C. (63° Fah.) is 1 in 263, judging from two concordant experiments.

In hot water it is much more soluble, crystallizing out on cooling. It is also soluble in alcohol, and crystallizes from a hot, strong solution on cooling. In ether it is only slightly soluble.

The compound in aqueous solution is decomposed by sulphuretted hydrogen, alkalies, and potassium iodide, with production of the corresponding mercurial salts.

0.5 gram, dissolved and treated with hydrogen sulphide, yielded 0.2487 gram mercury sulphide, and from the solution 0.203 gram

caffeine was extracted. 0.5 gram treated with silver nitrate yielded 0.312 gram silver chloride. These figures correspond to the percentages—

Caffeine	40.60
Mercury	42.88
Chlorine	15.42
	<hr/>
	98.90

whilst the formula, $C_8H_{10}N_4O_2, HgCl_3$, requires—

Caffeine	41.72
Mercury	43.01
Chlorine	15.26
	<hr/>
	99.99

If allowance be made for the fact that the older atomic weight (100) is employed for mercury, the formula, $C_8H_{10}N_4O_2, 2HgCl$, as given in Watts, shows the identity of the chloro-mercurate there described with this compound.

When this compound is heated in a tube in the bunsen flame it rapidly melts, decomposing in great part. If the heating be carefully carried out in an oil bath, with a thermometer in the tube, it will be found that a sublimate commences to form in the cool part of the tube at about $200^\circ C.$ ($392^\circ F.$), and that the whole melts at $244^\circ C.$ ($471^\circ F.$).

An attempt was made to see if the reaction would serve as a means of estimating caffeine, but so far the results are not as satisfactory as could be wished.

(a) 0.4 gram of the recrystallized caffeine gave a precipitate weighing 0.82 gram, which corresponds to 0.3737 gram alkaloid, or 93.42 per cent.

(b) 0.3 gram gave a precipitate corresponding to 93.26 per cent.

(c) 0.2 gram gave a precipitate corresponding to 92.5 per cent.

From these results it would appear that too much remains in solution, or becomes dissolved in the necessary washing, to permit the process usefully to be used as a quantitative one.

Some further experiments on this point are in progress.

The alkaloid can be precipitated from the citrate by this method as readily as from solution of the alkaloid itself.

I have much pleasure in acknowledging the services of Mr. Thos. Hunter and Mr. H. Pearmain in connection with this work.

The PRESIDENT, having moved a vote of thanks to Mr. Davies, said the salt produced was a very handsome one. He could not quite follow the latter part of the paper, which stated that mercuric chloride would precipitate the salt he referred to from citrate of caffeine as well as caffeine, because he believed they were pretty much agreed now that citrate of caffeine did not really exist as a chemical compound, and that most citrate of caffeine was nothing more than caffeine crystallized in a citrate solution. The Pharmacopœia described citrate of caffeine, and directed it to be made in a certain way, but it was not a definite chemical compound.

Mr. MARTINDALE said mercuric chloride formed double salts with many alkaloids. Some years ago he published a note on a hypodermic injection made with mercuric chloride, which was ordered in combination with morphia to relieve the pain. It precipitated the morphia, but a little glycerine held it in solution. The precipitation, therefore, would not identify caffeine more than a number of alkaloids.

Mr. J. C. UMNEY said that solution of iodide of potassium and mercuric chloride did not precipitate caffeine from solution. It was the only alkaloid he believed that it did not precipitate with that reagent.

Mr. R. H. DAVIES said he entirely agreed with the President that citrate of caffeine was not a definite chemical compound. He alluded to it merely to indicate that in respect to the different bodies, caffeine and citrate of caffeine, both well known to pharmacists, this particular reagent, mercuric chloride, acted as a test for caffeine as well in the one case as in the other. It was true that mercuric chloride was a very general reagent for alkaloids, but he was not aware that with any other alkaloid it would give a similar compound or anything which would be mistaken for that obtained with caffeine. If the crystals were examined in the way described, by putting some into hot water and permitting them to recrystallize, the whole behaviour was so distinctive that he was not aware that any such compound was produced with any other alkaloid, although he knew that as a precipitant of alkaloids mercuric chloride had been known for a long time. It was true, as Mr. Umney said, caffeine was not precipitated by Mayer's reagent, and as far as he was aware it was almost the only alkaloid which was not; but by many people caffeine was hardly regarded as an alkaloid, as it gave no alkaline reaction to ordinary litmus. A singular thing about this com-

pound was, that if one added iodide of potassium to its aqueous solution, the mercuric iodide at first produced, on dissolving in the excess of potassium iodide, did not yield a clear solution, but one having a somewhat similar appearance to that usually caused by adding Mayer's reagent to other alkaloidal solutions. He had not been able to get a large quantity of that precipitate, or he should like to have ascertained whether its composition was at all analogous to that of the precipitate usually caused by Mayer's reagent.

In the absence of the authors the following paper was read by Mr. Naylor—

A COMPARATIVE EXAMINATION OF THE TESTS FOR METHYLATED SPIRIT.

BY E. J. MILLARD AND A. CAMPBELL STARK,
Pharmaceutical Chemists.

Some time ago, whilst trying a newly proposed test for methylated spirit, we were struck by the fact that no reliable data could be found as to the limits of the tests already in use, nor could we obtain any definite information as to which of the known tests had been found to be the most delicate and satisfactory. It seemed to us, therefore, that a comparative examination of the tests for methylated spirit, with a view to deciding, not only the relative reliability of the various methods, but also their respective suitability for pharmaceutical testing, would be useful.

Our inquiry was also extended to the conditions resulting from the use of methylated spirit in making certain pharmaceutical preparations; but the time at our disposal was insufficient to fully carry out the necessary work in this part of the subject, and we hope to communicate it on a future occasion.

Methylated spirit, as prepared under the supervision of the excise officers, consists of a mixture of 1 part of wood spirit and 9 parts of spirit of wine. At one time the excise used to supply the wood spirit for methylating purposes, but now they are satisfied with taking samples of the wood spirit to be used, and examining them to see if they meet the requirements of the regulations. This examination chiefly consists in ascertaining the boiling point (which should be near that of the spirit of wine used), acidity, specific gravity, miscibility with water, etc. The proportion of the chief ingredients always present in wood spirit is disregarded.

If the sample of wood spirit is found to be too highly rectified, the methylator is warned that he uses it for methylating at his own risk. The tests in use may be divided into two groups, those depending on the presence of acetone, invariably present in wood spirit, and those depending on the presence of methyl alcohol.

The strength of the spirit we employed in the comparative experiments made were 0.5, 1, 2, and 5 per cent. of wood spirit. The wood spirit employed we used in the form of methylated spirit, and this we considered as containing 10 per cent. of wood spirit. The same spirit was of course used throughout the whole of the experiments. The spirit employed for the dilution of the methylated spirit (except in the case of Riche and Bardy's test) was of rectified spirit strength, and we ascertained that it contained no more than the trace of aldehyde and other reducing bodies permitted by the British Pharmacopœia.

The following are the tests examined by us, with a summary of results:—

No. 1. This test, proposed by Professor J. Emerson Reynolds, depends upon the presence of acetone, and the formation with it, under the condition described, of the aceto-mercuric compound— $2((\text{C H}_3)_2\text{C O})(\text{Hg O})_3$.*

The following is an outline of the process for applying the test.†

200 c.c. of the spirit are taken, and 50 c.c. rapidly distilled off. The distillate mixed with an equal bulk of water, a few c.c. of potassium hydrate solution added, and the mixture slightly warmed. Solution of mercuric chloride is now cautiously added, the mixture (still alkaline) agitated and filtered clear. Much of the alcohol is allowed to evaporate slowly off, and the residue divided into two portions (*a* and *b*). (*a*) Violently boiled for a few minutes, when, if acetone be present, a yellowish white, gelatinous precipitate suddenly makes its appearance. (*b*) Dilute acetic acid added in excess produces the same kind of precipitate.

The following were the experiments tried by us with this test on distillates containing the percentage of wood spirit stated.

(1) Distillate containing 0.5 per cent. wood spirit. (*a*) No distinct precipitate was produced. (*b*) Only faint opalescence on the addition of acetic acid.

* Emerson Reynolds' "Experimental Chemistry," part iv. p. 105.

† This and the following three tests are taken from Allen's "Commercial Organic Analysis," vol. i. p. 50.

(2) 1 per cent. of wood spirit. No precipitate was obtained on boiling (a). On the addition of dilute acetic acid a slight precipitate was produced with (b).

(3) 2 per cent. of wood spirit. A precipitate was obtained on boiling (a) and also on the addition of dilute acetic acid to (b).

(4) Blank experiment with rectified spirit gave a faint opalescence on the addition of dilute acetic acid to (b). No precipitate was formed on boiling (a).

We conclude that the working limit of this test is reached with the presence of two per cent. of wood spirit in the distillate, for in view of the opalescence obtained with rectified spirit alone, on the addition of acetic acid, the test can not be depended upon unless the precipitate on boiling is also produced.

No. 2. *Cazeneuve's Test*.—This test depends upon the reducing action of acetone, and other bodies present in wood spirit on solution of permanganate of potassium.

Contrary to our expectations, we have found this test, applied in the manner described below, to be both delicate and reliable.

The method we adopted, somewhat modified from that given by the author of the test, was as follows: 50 c.c. of the sample of methylated mixture were taken and distilled. The first 20 c.c. were collected separately, and the remainder in five portions of 5 c.c. each.

5 c.c. of a solution of permanganate of potassium (of the strength of 5 grams to a litre of distilled water) was placed in each of five clean test tubes. To one of these was added each successive 5 c.c. of the distillate as it came over, and the colour and appearance of a precipitate carefully noted.

The first distillate of 20 c.c. received 2 c.c. of permanganate solution.

By this method so small a quantity as 5 per cent. of wood spirit, equal to 5 per cent. of methylated, can be easily detected in a suspected sample, the purple colour of the permanganate changing instantly to red. The effect of the same quantity of permanganate solution on rectified spirit, of known purity, should be observed at the same time for comparison.

The change of colour is followed, sooner or later, by a precipitate, and we have endeavoured to render the test more exact, by observing the time required for the purple colour to change and for the precipitate to make its appearance. From these two data may be inferred approximately the proportion of wood spirit present.

The following table embodies the results of our experiments with Cazeneuve's test:—

Fractions.	1. (20 c.c.)	2. (5 c.c.)	3. (5 c.c.)
Rectified Spirit. {	Purple 1 min., ppt. in 2 mins.	Purple 1½ min., ppt. in 4 mins.	Purple 1 min., ppt. in 4 mins.
0·5 per cent. {	Red at once, ppt. in 2 mins.	Purple ½ min., ppt. in 2 mins.	As No. 2.
Wood Spirit. {	Red at once, ppt. in 1½ min.	Red at once, ppt. in 2 mins.	Red at once, ppt. in 1½ min.
1 per cent. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.
Wood Spirit. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.
2 per cent. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.
Wood Spirit. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.
5 per cent. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.
Wood Spirit. {	Red at once, ppt. in 1 min.	Red at once, ppt. in 1½ min.	Red at once, ppt. in 1 min.

Fractions.	4. (5 c.c.)	5. (5 c.c.)	6. (5 c.c.)
Rectified Spirit. {	Purple 1 min., ppt. in 3 mins.	Purple 1 min., ppt. in 2 mins.	As No. 5.
0·5 per cent. {	Purple ½ min., ppt. in 2 mins.	As No. 4.	Red at once, ppt. in 3 mins.
Wood Spirit. {	As No. 3.	Red at once, ppt. in 2 mins.	As No. 5.
1 per cent. {	As No. 3.	As No. 3.	Red at once, ppt. in 2 mins.
Wood Spirit. {	As No. 3.	As No. 3.	As No. 3.
2 per cent. {	As No. 3.	As No. 3.	As No. 3.
Wood Spirit. {	As No. 3.	As No. 3.	As No. 3.
5 per cent. {	As No. 3.	As No. 3.	As No. 3.
Wood Spirit. {	As No. 3.	As No. 3.	As No. 3.

The limits of the test appear to be reached with the presence of 5 per cent. of wood spirit.

The vertical columns of the table given show that the time taken until the precipitate begins to appear, depends to a certain extent upon the proportion of wood spirit present in the sample tested. The precipitate is very fine, and is followed by turbidity, the whole solution turning a dark brown colour. If wood spirit be present, the colour of the permanganate is, it will be seen, speedily changed by *all* the fractions. If aldehyde be the only contaminant, the first fraction of 20 c.c. will act upon the permanganate at once, and the succeeding fractions less and less in the order in which they are collected.

No. 3. The test proposed by MM. Riche and Bardy belongs to the second group of tests; it depends upon the presence of methyl alcohol, and the formation with it of methyl aniline violet.

It is applied in the following manner:—10 c.c. of the sample

of spirit (rectified, if necessary, over carbonate of potassium) are taken and mixed with 2 grams of amorphous phosphorus and 15 grams of iodine. The mixture is distilled, from a water bath, into 30 c.c. of water. Iodides of methyl and ethyl distil over, and settle to the bottom of the water, in an oily layer. This is separated and mixed with 5 c.c. of aniline. This mixture should be gently warmed; we have never found it necessary to moderate the action (as recommended by the authors) by placing the flask in water. After standing one hour, the aniline compound is boiled with water, and solution of caustic soda added; an oily layer now rises to the top of the liquid (usually to the amount of 7 to 8 c.c.). One cubic centimetre of this is taken and intimately mixed with an oxidizing mixture of sand 100, chloride of sodium 2, and cupric nitrate 3 parts. This mixture is placed in an open tube and heated at 90° C. for eight or ten hours. The dried product is then exhausted with 100 c.c. of warm alcohol (we found methylated spirit to answer perfectly), and filtered.

If *no* methyl alcohol be present, the resulting liquid is red; but if 1 per cent. of methyl alcohol be present, the liquid has a distinct violet tinge. This test was tried upon all the strengths of spirit used by us, including pure alcohol, and we exhibit tubes containing the resulting liquid in each.

1. 0·5 per cent. wood spirit. This liquid is hardly distinguishable from that of pure alcohol, but on diluting largely with water a violet colour is perceptible.

2. 1 per cent. wood spirit. This liquid has a distinct violet colour.

3. 2 per cent. wood spirit. The violet colour is more pronounced.

4. 5 per cent. wood spirit. The violet colour, although not of a deeper tint than that with 2 per cent., is yet of a more brilliant hue.

The colours of the above are best seen comparatively by placing a drop of each liquid on a piece of white filter paper, the difference in hue is then very noticeable.

On diluting each liquid with 1600 times its volume of water, and placing a piece of floss silk therein and boiling, the silk becomes dyed a more or less deep shade of violet, according to the amount of methyl alcohol present. We exhibit samples of silk dyed in this manner.

It will be seen that the difference between silk dyed with the liquid from 5 per cent. wood spirit mixture and that dyed with the liquid from pure alcohol is recognisable.

It has been noticed by one of us* that aniline heated with the sand mixture produces a solution having a somewhat violet tint. The difference between this colour, however, and that produced by .5 per cent. wood spirit mixture is too apparent to cause confusion.

We conclude that Riche and Bardy's test is both delicate and reliable, and that by it the presence of .5 per cent. wood spirit can be satisfactorily proved. But the process for its application, requiring as it does twelve hours' constant attention, and some considerable outlay, is far from suited for the use of the ordinary pharmacist.

We were induced to devote especial attention to it, as it is stated to be the test applied by the Somerset House authorities to suspected preparations.

No. 4. Process devised by J. T. Miller.

The method depends on the presence of methyl alcohol and its oxidation to formic acid.

It is thus applied :

Three grams of potassium bichromate and 2.5 c.c. of sulphuric acid are mixed with 25 c.c. of water and 3 to 4 c.c. of the suspected spirit added. The mixture is allowed to stand for fifteen minutes and distilled; 25 c.c. are collected, treated with a very slight excess of sodium carbonate, boiled down to 10 c.c., and rendered feebly acid with acetic acid; .1 gram of nitrate of silver dissolved in 3 c.c. of water is now added, and the whole gently heated for two or three minutes. If methylic alcohol be present, a copious precipitate of dark brown or black metallic silver is formed, and a film of silver is produced on the side of the tube.

Applied to the following strengths of wood spirit mixtures :—

(a) .5 per cent., wood spirit yielded a liquid which darkened somewhat on the addition of the silver solution, and after prolonged heating precipitated, no trace of a mirror reaction being formed.

Rectified spirit yielded an exactly similar result.

(b) 1 per cent. wood spirit gave no mirror reaction, but the amount of precipitate of reduced silver was somewhat larger.

(c) 2 per cent. wood spirit gave a slight but distinct mirror reaction and a copious precipitate.

We conclude that the test is only satisfactory on methylated mixtures containing not less than 2 per cent. wood spirit, and

that nothing short of a distinct mirror reaction can be regarded as conclusive.

It will sometimes be noticed that on the addition of the nitrate of silver solution a reddish precipitate is formed. This we believe to be due to chromic acid passing over with the acetic and formic acids formed. It is usually soluble on warming, and does not interfere with the working of the test.

In applying the test to tinctures or liquids containing fixed matter, the spirit is distilled off and the test applied to the distillate.

No. 5. A test has been proposed by O. Hehner,* depending upon the reduction of bichromate of potassium by the products of the oxidation of methyl alcohol present in wood spirit, and the subsequent estimation of the unreduced bichromate by iron solution.

We have not yet been able to try this upon a sufficient number of methylated mixtures to arrive at a comparative result of any value, but we hope to do so at a future date.

The main results of our experiments may be summed up by statements made in the remarks on Cazeneuve's test. Although, as stated, we consider this test upon the whole to be the most convenient and delicate for the pharmacist's purpose, we do not regard it as entirely satisfactory. It is obvious that a test depending upon the presence of a body or bodies present in wood spirit in varying proportions cannot be regarded as absolutely dependable. We trust that some reliable and convenient test, less tedious than Riche and Bardy's or Hehner's, and depending upon the presence of methyl alcohol, will before long be devised. Our object has been to summarize the present state of knowledge on the matter, and to assist the pharmacist in choosing from a multitude of counsellors.

The use of methylated spirit in the manufacture of certain pharmaceutical preparations has, owing to the permissive action of the revenue authorities, increased of late years. From these preparations the spirit is finally removed by heat, and one of the conditions upon which permission to use it is granted, is, that no appreciable trace shall be left in the finished product.

In a recent issue of a trade journal,† Mr. F. W. Fletcher, F.C.S., advocated the removal of this permission on the ground that the finished products often contain sufficient methylated spirit to be recognised by merely physical tests. We have not found a pre-

* *Analyst*, xii. 23-29.

† *Chemist and Druggist*, vol. xxxvi. p. 742.

paration presenting this characteristic, but it could only be due to insufficient care in the manufacture.

In pursuance of the second part of our investigation (which is at present incomplete), we have prepared extracts from the same drug with methylated and with rectified spirits, and after careful distillation of solutions of them in rectified spirits, have examined them by all the foregoing tests. In no case did we find an appreciable difference between the two distillates.

By distilling *twice* alcoholic solutions of the two extracts we obtained with Cazeneuve's test, on applying it to the two distillates, a very slight difference between the two reactions. Thus the appearance of the red colour, and its succeeding precipitate, occurs in rather less time with the distillates from the methylated extract, than with that from the rectified. The difference however is so slight that a more extended examination is required before we can attribute it to the difference of the menstruum used in making the two extracts. Whatever it may be due to, it is less than that shown by the presence of 5 per cent. of wood spirit, and this we consider to be the limit of Cazeneuve's test; moreover the distillates contained appreciable quantities of volatile oil. (An attempt was made to remove this by the modification suggested by Habermann,* but the results were not satisfactory.)

Mr. Fletcher also makes the statement that the percentage of loss in making extracts is not greater than that in making tinctures; here we feel obliged to differ considerably. Our opinion is based upon the experience of one of us in the manufacture of both classes of preparations. We have found the loss in making extracts, under the most favourable conditions possible, to be rarely less than 10 per cent., whilst the loss in the manufacture of tinctures, by evaporation and the quantity left in the marc, after the application of hydraulic pressure, is never more than 5 or 6 per cent., and in some cases considerably less.

In confirmation of this, we may mention that the recent concession regarding the drawback upon medicinal tinctures for export made by the Inland Revenue has fixed the "loss in manufacture" of tinctures and fluid extracts at the uniform rate of 4 per cent.

These considerations are, we believe, convincing arguments in favour of continuing the permission, provided that the final product contains no trace of the objectionable features of the methylated spirit. That this can be insured, with adequate care, is known by every manufacturer; indeed, if it were not so, we

* *Zeitschrift für Analyt. Chem.*, xxvii. 663.

are confident that the practice would be discontinued spontaneously. The preparations, when properly performed, are in all respects identical with those made with rectified spirit, and some slight advantage is derived from the fact that methylated spirit has alcoholic power 60 over proof, against the 56 over proof of rectified spirit.

In connection with this subject, we would draw attention to the possibility of a complete, or partial, substitution for wood spirit for denaturing alcohol. An Act passed through Parliament this year confers power on the revenue authorities to alter the ingredients used for methylation. By 53 Vict. ch. 8, part 8, sec. 32. (1) "The substance mixed with spirits for the purpose of methylation may be *any combination of substances* approved for the purpose by the Commissioners, and the term 'methylated spirit' in the Spirits Act, 1880, shall, in lieu of the meaning thereby assigned to it, mean spirits mixed with *any substance or combination of substances* approved for the purpose of methylation by the Commissioners."

The principal substance which has been recommended as a partial substitute for wood spirit in denaturing alcohol is pyridine. It has been extensively employed in Germany, where the method at present in force is the addition of 2 per cent. of wood spirit and '5 per cent. of pyridine. The same method has been adopted in Austro-Hungary and Switzerland. We exhibit a sample of this mixture, and of others in use at various times. The high boiling point of pyridine, and its poisonous nature would, in our opinion, render methylated spirit containing it extremely unsuitable for the purposes it is legitimately applied to in English pharmacy.

The PRESIDENT then moved a vote of thanks to the authors, and drew attention to the tubes upon the table representing the colours referred to, which showed the great delicacy of the test.

Mr. LINFORD said there was a test proposed in the new Dutch Pharmacopœia for methylated spirit used in making sweet spirit of nitre. He had made some sweet spirit of nitre from methylated spirit to try this test. The methylated spirit only contained 10 per cent. of wood naphtha, but he found, on distilling the spirit of nitre from that, 5 per cent. mixed with ordinary spirit of nitre, which would be equivalent to only $\frac{1}{2}$ per cent. of wood naphtha, was easily detectable by this test. The Dutch used

iodine and ammonia, and produced iodoform, and the curious thing was that this should be produced when methylated spirit was employed, but it was not when alcohol was used in the same way. He could not quite understand the reason, but it was a very reliable test. If there were not more than 5 per cent. of methylated spirit of nitre in the mixture, it had to be allowed to stand two hours before a visible precipitate of iodoform was obtained, but the smell could be detected the moment mixture was effected, and there was no sign of it when the pure spirit was used.

The PRESIDENT said this was a fact well worth knowing, and he was quite sure the authorities at Somerset House would be glad to know it also. They were always on the look-out for anything which might prevent a loss to the revenue, and no doubt this test would prove a greater weapon in their hands.

The Conference then adjourned until the next day.

Wednesday, September 3rd, 1890.

The PRESIDENT took the chair at 10 o'clock, and said the first business was to repair an omission which had been made on the previous day. The report of the Executive Committee and financial statement had been read, but had not been formally adopted.

Mr. WARD moved—

“That the Report and Financial Statement be received, adopted, and printed in the Transactions.”

He said it was highly gratifying to find they were in such a satisfactory condition financially, and especially that the affairs were conducted so economically and yet so efficiently.

Mr. WEST had great pleasure in seconding the motion. He thought more applications ought to be made to the fund for the purposes of research, and hoped some members would apply for funds for this purpose.

The PRESIDENT, in putting the motion, said he was quite sure the Executive would agree with this remark. They were only anxious to apply the funds, if suitable applicants would make use of them.

The motion was then carried unanimously.

The following two papers were then read by Mr. Naylor.

OROXYLUM INDICUM, VENT.

By E. M. HOLMES, F.L.S.

About two years since, Dr. W. Dymock, of Bombay, sent me several Indian drugs in quantity, for the purpose of having them submitted to a chemical examination in this country. So little is known of the chemistry of many of the native remedies employed in India, and there are so few workers in this field in that country, that Dr. Dymock was desirous of obtaining as much information as possible concerning them for his forthcoming "Pharmacographia Indica."

Mr. W. A. H. Naylor having already so successfully investigated the active principle of *Hymenodictyon excelsum*, and having kindly consented to investigate others when opportunity offered, I handed to him the *Oroxylum indicum* as being one of the most likely to yield interesting results, inasmuch as it belongs to a natural order of plant, of which the chemical and physiological properties are but little known, viz., Bignoniaceæ. The other plants of this natural order that are employed in medicine in India are six in number, viz., *Heterophragma Roxburghii*, D.C.; *Stereocarpum xylocarpum*, Wight., of which the tar obtained by the destructive distillation of the wood is used in scaly skin diseases; *Stereospermum chelonoides*, D.C., the juice of which, mixed with lime juice, is employed in maniacal cases, and an infusion of the pleasant-tasted root and leaves as a cooling drink in fevers, the leaves of the allied species, *S. suaveolens*, D.C., which is often confounded with it, being sometimes similarly used; and lastly, *Dolichandrone falcata*, Seem., which has the reputation of being used to procure abortion. Of all these the active chemical constituents are unknown. *Oroxylum indicum*, being a drug of considerable importance in Hindoo medicine, seemed the most likely to repay the trouble of a chemical investigation, more particularly since it has been found by Dr. Evers to possess a definite therapeutical action. He treated twenty-eight cases of acute rheumatism with the drug, employing the bark also externally in the form of a bath. The dose of the powder given was 5 to 15 grains, or an ounce of the infusion (one part to ten of boiling water) three times a day. Combined with opium it formed a much more powerful sudorific than the compound powder of ipecacuanha. He did not find it to possess any febrifuge property.

The bark is about two lines thick, the external portion consist-

ing of a soft spongy cork of a fawn or light brown colour, easily indented by the nail and striated longitudinally. The internal layer or liber is fibrous and of a greenish yellow tint. It has no odour. According to Dr. Dymock the bark is faintly bitter and a little acrid. In the specimen sent the acidity is perceptible but the bitterness scarcely so. He remarks that on placing a section under the microscope in a little water, the whole field is seen to be filled with delicate needle-shaped crystals which have escaped from the cut cells of the parenchyma. These crystals can be seen *in situ* in the cells which remain entire. These crystals I have not been able to detect, and the warty character of the bark mentioned by Dr. Dymock is not evident in the specimens I received.

With the exception of the description of the bark given above, the information given in these introductory remarks is derived from Dr. Dymock's "Materia Medica of Western India."

The bark is considered to be astringent and tonic, and to be useful in diarrhoea and dysentery. It is much used in Bombay as an external remedy in veterinary practice as an application to the sore backs of bullocks. For this purpose it is usually mixed with tumeric. The juice expressed from the roasted bark is mixed with mucheras (the astringent exudation from the trunk of *Bombax malabaricum*) for diarrhoea and dysentery.

Dr. Evers states that the Gonds employ a decoction of the bark as a discutient application to rheumatic swellings. He himself has found the powder and infusion of the bark to be most powerfully diaphoretic, and to possess in addition slight anodyne properties.

CHEMICAL EXAMINATION OF THE BARK OF OROXYLUM INDICUM.

By W. A. H. NAYLOR, F.I.C., F.C.S., AND E. M. CHAPLIN, F.C.S.

A. One pound of the bark reduced to fine powder was percolated to exhaustion with cold petroleum ether. The ether was distilled off, and the residue, which weighed about 1·8 gram, possessed the characters of a soft greenish brown fat, having an acid reaction and a slightly acrid taste. It was treated successively with ether and proof spirit; the former removed vegetable wax, which was subsequently identified as such after re-solution in limited quantities of ether and separation therefrom. The latter on evaporation

gave a brownish yellow residue small in quantity and crystalline. When further purified by extraction with ether, and the ethereal residue by benzol, it was golden yellow, unctuous to the touch and pronouncedly acrid. Under the microscope it presented the appearance of long, wavy, branching crystals, which dissolved readily in alcohol, chloroform ether, petroleum ether, and benzol.

B. The marc was next percolated with cold ether. After distilling off the greater portion of the ether, and allowing the remainder to evaporate spontaneously, a yellow mass studded with minute interlacing crystals was obtained, which when air-dried weighed about 4 grams. This product was treated with boiling proof spirit and filtered while hot; on cooling small yellow crystals fell out of solution. When quite cold the crop of crystals was collected and subjected to the action of boiling petroleum ether until freed from every trace of fat. It was then crystallized from boiling proof spirit until it had a constant melting point, and was no longer contaminated with uncrystallizable matter. The resulting crystals were dried under the receiver of an air-pump, and when constant weighed 0.9 gram. They were of a lemon yellow colour, about $\frac{1}{8}$ inch in length, and melted at $228.5-229^{\circ}$ C. Alcohol, ether, glacial acetic acid, and hot benzol dissolved them readily, but they were practically insoluble in water, hot or cold. The following reactions in connection with this interesting body have been noted, of which the most striking is its behaviour with the caustic alkalies. A minute quantity brought into contact with one drop of a weak solution of sodium potassium or ammonium hydrates causes it to assume immediately a cherry-red colour, which quickly passes into brick-red and olive-green.

Owing to the insolubility of the crystals in water a proof spirit solution was used in applying the following tests.

1. A solution of silver nitrate in proof spirit produced a bluish black colour immediately, and after the liquid had stood for a few minutes black particles of reduced silver were precipitated.

2. A solution of neutral acetate of lead in proof spirit gave a light red bulky precipitate insoluble in boiling acetic acid.

3. Lime water imparted an orange colour, which quickly changed to olive-green, followed by a precipitate of the same colour.

4. An aqueous solution of sulphate of copper gave a golden yellow colour, quickly followed by a dirty brown precipitate, the supernatant liquid being distinctly greenish.

5. Solution of ferric chloride (acid) produced a brownish red colour, which, in a few minutes, turned smoke colour.

6. Solution of subacetate of lead gave a golden-yellow precipitate.

7. An aqueous solution of mercuric chloride produced a white precipitate.

8. An aqueous solution of permanganate of potash, acidified with sulphuric acid, was *instantly* decolorized.

9. A solution of the crystals in proof spirit did not reduce Fehling.

We have attempted to hydrolyse this body by subjecting a strong alcoholic solution to the prolonged action of 10 per cent. solution of sulphuric acid at a boiling temperature, but without success.

We have also inquired into its nature and centesimal composition, but the results so far obtained are not sufficiently conclusive to be incorporated in this paper. We hope to be able to publish shortly a supplementary note dealing with points in process of investigation. Meanwhile, we propose that this interesting principle be designated *Oroxylin*.

C. The marc left after exhaustion with petroleum spirit and ether was percolated with cold absolute alcohol. The residue resulting from the distillation of the spirit was treated with cold proof spirit, which took up the greater part of it. The insoluble portion dissolved readily in boiling proof spirit, and, on examination, proved to be largely composed of the yellow crystalline body, oroxylin. The cold proof spirit solution of the alcoholic residue was evaporated to dryness, and the extract treated with water and filtered. The filtrate was treated successively with neutral and basic acetate of lead, and the precipitates after washing were suspended in water, decomposed by a current of sulphuretted hydrogen, and the resultant plumbic sulphide removed by filtration. Sulphuretted hydrogen was also passed through the filtrate from the basic or plumbic acetate, and the precipitated lead sulphide removed by filtration.

The three liquids thus obtained, which for convenience may be denominated i., ii., iii., were then evaporated down and the respective residues examined.

(i.) It was dissolved in the smallest quantity possible of cold water and diluted with many times its volume of alcohol. After setting aside for twenty-four hours a precipitate fell, giving the general characters of parapectin. The supernatant liquid on evaporation left a scaly residue, astringent to the taste, and perfectly soluble in water. Its aqueous solution reduced Fehling and gave a copious bluish black precipitate with ferric chloride. Lime-

water produced a bright golden-yellow colour, followed by a reddish brown precipitate. From the tannins proper it differed in that it was not precipitated by solution of gelatine.

(ii.) This residue apparently consisted of pectin intermixed with small portions of No. iii.

(iii.) This was a dark uncrystallizable treacly-looking residue, which imparted to the palate a feeble sensation of sweetness. It was very soluble in water and reduced Fehling's solution abundantly. A strong aqueous solution was precipitated by absolute alcohol.

D. The marc from the alcoholic extraction was finally percolated to exhaustion with cold water. The liquor was evaporated down and the extract obtained taken up with hot water. A considerable amount of albuminous matter, which remained insoluble, was removed by filtration. The filtrate was treated successively with neutral and subacetate of lead, and the precipitates decomposed in the same manner as described under *C*. The three liquids obtained, i., ii., iii., were evaporated down.

(i.) This residue was the smallest of the three. After standing for a considerable time some crystals were deposited, which on examination proved to be citric acid.

(ii.) Nothing of a crystalline nature was found in this residue. It appeared to consist chiefly of extractive matter.

(iii.) This residue after treatment with alcohol had the same characters and possessed the same properties as *C*. iii. It was not further examined.

The result of our examination of this bark may be summarized by stating the different principles which we have found—(1) crystalline fat; (2) wax; (3) acrid principle; (4) oroxylin; (5) chlorophyll; (6) pectinous substances; (7) Fehling-reducing principle; (8) astringent principle; (9) citric acid; (10) extractive matter.

The PRESIDENT said the Conference was much indebted to Mr. Holmes for bringing forward the materia medica portion of this subject, and also to Mr. Naylor and Mr. Chaplin for examining the drug chemically. The subject could hardly be discussed at present, but he would point out that the latter paper represented a great deal more work than appeared on the surface, and no doubt it would be carefully studied when it appeared in print.

Mr. GROVES said he did not understand to what class of bodies oroxylin belonged. Was it identified sufficiently to classify amongst a group of similar bodies?

Mr. NAYLOR said it appeared to have many of the characters of a quinone derivative. The authors had treated it with zinc dust, but were not altogether satisfied with their experiments, and therefore deferred stating the results until after a more complete examination. They were however inclined to think that it was the active principle.

Mr. MACEWAN said he understood that the bark had an acid as well as an acrid taste. Was the acidity attributed to the citric acid?

Mr. NAYLOR said he was scarcely able to answer the question. It did not appear to him to have a particularly acid taste. They found a small amount of citric acid certainly, but they did not lay much stress on the acidity.

Mr. MACEWAN said it might be more acid in the fresh condition than in the dry.

The next paper read was on—

HYDRARGYRI IODIDUM VIRIDE FOR MEDICINAL USE.

By WILLIAM MARTINDALE, F.C.S., AND W. A. SALTER.

Pharmaceutically, on account of its instability, this preparation has obtained a bad name. It has therefore been expunged from both the last British and German Pharmacopœias. As there is still a considerable demand for it for medicinal use, our object has been to ascertain how far this stigma is deserved, and if possible, to find a remedy for it. It will be remembered that the process of the B.P., 1867, yielded an uncertain product. The proportions of iodine and mercury ordered to be used are almost the exact combining proportions of the two elements to form (theoretically) mercurous iodide, there being only '0067 per cent. excess of iodine ordered.

In the U.S. and late German Pharmacopœias the proportions are reversed, so that a slight excess (1.6 per cent.) of mercury is present. The French Codex employs still more mercury (5.93 per cent. excess). In all cases the two elements are simply directed to be moistened with spirit and triturated till they have combined. The U.S. and German Pharmacopœias and French Codex order the product to be washed with alcohol and dried with exclusion of light.

The B.P., 1867, describes it as a dull green powder, insoluble in water, which darkens upon exposure to light, and states that when shaken with ether nothing is dissolved. This indicates the absence of mercuric iodide, which, however, is seldom completely absent, and constitutes its danger, as it is much more irritating than mercurous iodide. On exposure to light the green iodide darkens on the surface, becoming reduced to metallic mercury, and red iodide is formed, with probably traces of the two oxides. In place of being dull green, as officially described, in commerce it is more frequently met with as a dingy yellow powder, owing it is said to the partial formation of an intermediate compound, the mercurioso-mercuric iodide, Hg I , Hg I_2 . Mr. C. H. Wood, in a paper (*Pharm. Journ.*, 1868, p. 502), endeavoured to prove that in place of the mercurous iodide being a green preparation it should be, as described in the last London Pharmacopœia, a dingy yellow. Having weighed his evidence, we hardly think he has proved his case, and as the *green* iodide is in request, we think it should be supplied, and the colour of the chemically pure mercurous iodide left to be further investigated by chemists.

We have examined several samples, with the following results :—

1. Physical characters—

- | | |
|--|--|
| $\left. \begin{array}{l} A \\ B \\ B_1 \end{array} \right\}$ | These are of a uniform dull yellowish green colour, almost indistinguishable from each other; B_1 is slightly the darkest. |
| C | Dull yellow, with slight tint of green. |
| D | Greyish green colour. |
| E | Dull yellowish green. |
| F | Dull yellow, with slight tint of green, like C . |

2. As to the amount of mercurous iodide contained in them. An equal quantity of each was placed on a filter and well washed with pure ether. The washings on evaporation yielded per cent. as shown in the table below.

3. As to the amount of mercurous iodide contained in the samples, after washing with ether, drying, allowing them to remain in contact with granulated zinc and diluted acetic acid, precipitating with nitrate of silver and washing, carefully drying and weighing the precipitate without exposure to light, they yielded iodide of silver equivalent to percentages of Hg I , as follows :—

<i>A</i>	.	.	.	.	.	81.6 of Hg I,	.1 of Hg I ₂
<i>B</i>	.	.	.	.	.	83.07	„ .24 „
<i>C</i>	.	.	.	.	.	91.62	„ .2 „
<i>D</i>	.	.	.	.	.	66.65	„ .26 „
<i>E</i>	.	.	.	.	.	85.78	„ .34 „

We endeavoured to estimate the amount of mercury (combined and free) in them by Mr. Wood's process of dissolving each sample in hydrochloric acid and chlorate of potassium, evaporating the solution nearly to dryness, diluting, precipitating with stannous chloride, and collecting and weighing the precipitated metallic mercury. It was found, however, that discordant results were obtained, and we consider that without estimating the mercury by distillation accurate results are not to be obtained.

We found the samples *A*, *B*, *B*₁, *D*, and *E* all contain an excess of free mercury, *D* to the extent of over 30 per cent. In regard to *A*, *B*, *B*₁, and *D*, we were, in fact, aware of this before we commenced our experiments. The sample *D*, although labelled *Hydrargyri iodidum viride*, B.P., 1867, we had found in forming into a pill mass, say with extract of gentian as an excipient, that the free mercury separated from it in globules distinctly visible to the naked eye.

The samples *A*, *B*, and *B*₁ were of our own manufacture. *A* was prepared on October 13, 1887, *B* on May 19, 1890, and *B*₁ on August 12, 1890. These have been prepared to somewhat approximate to the article obtained from the makers of the sample *D*, who had been in the habit of supplying us with a fairly stable preparation, although we discovered it contained a large excess of mercury.

C and *D* were also of English manufacture, and *E* German. *F* was prepared by ourselves by the B.P., 1867, process and proportions on August 12, 1890. It has decidedly a dingy yellow rather than a dull green colour.

We found none of these samples when heated with aniline to yield the magenta coloration which has been given as a test for the presence of mercuric iodide by W. Squire (Watts' "Dictionary," vol. iii. 904), notwithstanding that in each case traces were dissolved from them by ether.

M. Lefort (*L'Union Pharmaceutique*, xiv. 75, and *Pharm. Journ.*, 1873, 823) suggests a process of manufacturing mercurous iodide by the double decomposition of a mixed solution of mercurous acetate and pyrophosphate of sodium with a solution of iodide of potassium. We have not tried this process, because we

have understood the product to be unstable; it is, we fear, too pure to be stable.

The samples *A*, *B* and *B*₁ have been prepared by using one-fourth, or 25 per cent., more than the theoretical quantity of mercury required, and modifying the directions of the British Pharmacopœia, 1867, as follows:—

Take of—

Mercury, by weight	1½ ounces.
Iodine	278 grains.
Rectified Spirit	½ ounce, or a sufficiency.

Place the mercury in a porcelain mortar and pour over it 1 fluid drachm of the spirit. Add gradually the iodine, and triturate constantly, adding occasionally a few drops more of the spirit, to prevent overheating and the formation of red iodide of mercury. Continue the trituration until metallic globules are no longer visible and the whole assumes an uniform green colour. The product should be dried in a dark room on filtering paper by simple exposure to the air, and preserved in an opaque bottle.

The trituration should be conducted without exposure to daylight, and in making the above quantity it should be continued for at least half an hour. During drying it is apt to become a little gritty; the preparation should therefore be lightly rubbed again to a fine powder. It is best prepared in small quantities, and it should, in fact, be a home-made preparation.

We see no advantage in the after-washing with alcohol, if an excess of mercury be present, and the preparation has been carefully made in the first instance. Theoretically, we consider that it is hardly possible for the red iodide to exist in the presence of such a definite excess of mercury as we recommend. The iodine should be very gradually added, as there is a greater tendency for the more stable mercuric, rather than the mercurous, iodide to form; this may be noticed in the red colour the mixture is apt to assume while triturating it. In fact, if exactly equivalent quantities are manipulated, on account of the iodine offering more surface contact than the mercury, it is impossible to avoid the formation at first of a considerable quantity of the mercuric iodide, which has to be reduced to the mercurous state by continuous trituration. This imperfect formation of the green iodide rather than decomposition on keeping, will we think account for the appearance of particles of the red iodide sometimes visible in the commercial preparation when it is rubbed with a knife between a fold of paper.

In the preparation we suggest free mercury will exist to the extent of about 13·2 per cent. in the finished product, which, after making allowance for the oxide contained in it, fairly agrees with the experimental data resulting from the estimation of the combined iodine in the samples examined. No globules of free mercury can be seen in these samples, nor do they become visible even with a lens, when manipulated into pill masses. This is a definite excess of mercury, but not so much as exists in the commercial sample *D*, which contains an unwarrantable excess.

The samples are not pure. If the preparations were again made official, this could be recognised, as is done in regard to several of the unstable preparations of iron. But we hold that a green iodide of mercury can be prepared, and with reasonable care it can be kept sufficiently stable and uniform in appearance for use in medicine. It is green, and if kept excluded from light or in amber-tinted bottles it is ever green, and may be prepared free from all but a trace of mercuric iodide. Estimated as above, it should yield iodide of silver equal in amount to not less than 60 per cent. of the weight taken.

That the free mercury it contains is no detriment to the preparation, I give the opinion of two surgeons who treat diseases of the urinary organs, and who are in the habit of prescribing it. Mr. G. Buckston Browne says:—

“I have long found the green iodide of mercury very useful in the early treatment of syphilis, and as you know, I have always been careful to have it *green*, not changed by exposure to light, simply because the red iodide is so irritating to the intestines. A little free mercury can do no harm.

Mr. Campbell Williams writes:—

“So far as I have used your preparation of the green iodide of mercury, with one exception, it seems to have been unirritating. I think it fair to state that in that instance the patient had partaken of fruit and beer. I have been in the habit of prescribing the old Hydrarg. Iod. Vir. (freshly made) whenever a rapid action was required. The free mercury in your preparation does not seem detrimental, and if stability can be thus guaranteed, you will have removed the great drawback to its use. You will see by prescriptions that I have used it in doses of $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{2}$ grain, combined with $\frac{1}{4}$ grain P. Opii. and grain i. Ext. Hæmatoxyli.”

A few words about the dispensing of it. One prescriber orders it in pills containing $\frac{1}{6}$ grain in each, and directs one, two or three times a day, running up and down the scale as the patient requires

the medicament. It is best massed into pills with sugar of milk, syrup and gum. The pills should be of a sap-green colour, which may be taken as a test of their quality. They may be coated with sandarach solution, and should be sent out in amber-tinted bottles.

The instability of this preparation, we think, has been overestimated, as the amount of mercuric or red iodide found in the worst sample examined is insignificant, and we therefore consider that it has been condemned without just cause, as the dose, 1 to 3 grains in the last B.P. was misleading, and much too large, $\frac{1}{6}$ to $\frac{1}{2}$ grain being the dose usually given, and generally with good results. It is mild in action, and as a useful remedy we feel sure it will continue to be prescribed.

Mr. ABRAHAM said the Conference was much indebted to Mr. Martindale for this paper. The green iodide of mercury was in regular demand, and it was rather difficult to comprehend why it was omitted from the Pharmacopœia. The fact that it had hitherto been somewhat varying in composition was the best reason for keeping it in, in order that a constant composition might be arrived at. If Mr. Martindale could show that by using an excess of mercury this constant composition could be obtained, it would be a very valuable point. According to his recollection this preparation was originally introduced into the Dublin Pharmacopœia, where it was ordered to be made with alcohol, not rectified spirit, and his father always considered it important to use absolute alcohol, which had at least this important advantage, that it was entirely dissipated during the trituration, and no further drying was required.

Mr GERRARD asked how long Mr. Martindale had kept this preparation. He understood him to speak of some having been prepared in August of the present year, which was but a short time to go by. Twelve months keeping must have a considerable influence upon it.

Mr. CRIPPS said the table indicated that the iodine was not so easily oxidized as they were apt to assume, but he would like to know if the author had performed any experiments with a view of determining whether any oxidation took place after the pills were made, because the excipient introduced another factor, and possibly after a month some change might take place. A pill he had just broken was rather yellow in appearance, more so than he expected.

Dr. SYMES supported the statement that mercurous iodide was very largely prescribed, and that those who prescribed it obtained very satisfactory results. It seemed to him that was a reason why it should not be omitted from the Pharmacopœia. If a more or less unstable or indefinite substance were in the Pharmacopœia, its removal was not likely to make it more definite, and he was inclined to think this compound should again be replaced. He supported Mr. Martindale's statement that it should be made in small quantities, that it would not occupy a great length of time, and they should not be too particular about absolute dryness. It should be excluded from air and light as quickly as possible. In trying to remove the mercuric iodide by washing, on one occasion he found that it was possible to go on washing it out continuously and that a little fresh mercuric iodide was formed in the mere washing and drying; therefore the attempt to remove every trace seemed hopeless. So long as a preparation could be obtained such as was described, which even if not very definite, like their old friend spirit of nitrous ether, was still a good thing. If the medical profession required it, it was very desirable that it should be recognised, and a definite formula adopted for its preparation.

Mr. GROVES had been surprised to hear such a small dose mentioned as one-sixth of a grain. He should have rather expected it to have some resemblance to calomel, which was usually given in a large quantity. The question was, what became of the mercurous iodide when it got into the stomach, and was exposed to the digestive ferments? was it converted into the periodide, or what became of it?

The PRESIDENT said the author had referred to the passage in his opening address with reference to the use of green iodide of mercury and grey powder, and he could only say that in his experience they were much less used than formerly, and it seemed to him that the green iodide was left out of the Pharmacopœia for the best of all reasons, namely, that it was an unstable preparation. What Mr. Martindale had stated pointed strongly to the conclusion that it was a very unstable preparation. Mr. Martindale said in one place, "It was too pure to be stable." Again, Mr. Symes said that even while the washing of the salt was going on, mercuric iodide was being formed. Now surely if mercuric iodide was objectionable, and it was formed almost whilst you were looking at it, mercurous iodide could not be a reliable preparation to put into the hands of the physician, because although mercurous iodide was not a very potent preparation, mercuric iodide was both

powerful and dangerous. He must therefore stand up for the former editor of the *Pharmacopœia* in saying he had very good reason for omitting from the last edition the green iodide of mercury, or as it was more properly described, the yellow iodide, which was the name formerly given to it in the German *Pharmacopœia*. Mr. Wood's experiments went to show that the preparation would sometimes contain as much as 28 per cent. of mercuric iodide, though he was bound to say he showed how it could be prepared to contain a very small quantity—5 per cent. or less. There was no doubt that in consequence of that paper, and the experiments which had been made, and the arguments used by Mr. Wood, and the result of the discussion, Professor Redwood, the reporter of the *Pharmacopœia* Committee, did leave out the green iodide from the next edition, and he thought a better case would have to be shown than had been shown yet to induce the present reporter, Professor Attfeld, to recommend its re-adoption. At the same time, he should be glad to hear any further remarks on the subject, and the Conference was exceedingly indebted to Mr. Martindale, because the fact remained that green iodide was still prescribed, and so was grey powder. But why had grey powder got into such bad repute? Simply because it was such an uncertain preparation. The amount of oxidation which might take place depended very much on the amount of trituration, the amount of moisture in the chalk, and so on. Sometimes a grey powder was produced of one strength, and sometimes of another. And this variation did not end with the production of the article, beyond which Mr. Martindale did not seem to have gone. Mr. Gerrard properly raised that point—What about the keeping properties of the powder? He had seen grey powder which contained such a large quantity of mercuric oxide as to be positively poisonous, and had heard of cases of grey powder being administered to children where it had proved poisonous. Grey powder was still prescribed for syphilis, but it was much less used than formerly as a medicine for children, solely on account of its variability and bad keeping power. The grey powder and green iodide of mercury were very much on all fours in these respects.

Dr. SYMES asked if the President meant to suggest that pharmacists should dictate to the profession whether they should prescribe this remedy. His experience was limited to a certain area, but he dispensed the green iodide of mercury much more largely to day than seven years ago, and, therefore, it might be assumed that the medical profession found it useful and got the desired

results. Under these circumstances it was their duty to give the best preparation possible. He understood the President to say that it should be left out of the Pharmacopœia, and thus left less definite than it would be with a proper formula.

Mr. SCHACHT said the discussion led him to make a general remark which touched on extremely delicate ground, but still it was perhaps well that the observation should be made. There was no question in his mind that the aim of the pharmacist generally should be to produce the purest article he could, but he could not help thinking that now and then that principle might be stretched a trifle too far, so as to deprive themselves and others of valuable remedies, because they were not absolutely pure. He was encouraged to make this remark from the consideration that they very rarely in nature found a pure article. No one knew better than the chemist how extremely rare it was for nature to present them with an uncombined element, and that when two pure elements did occur together they would seldom react. He would take two familiar instances. Pure zinc was acted upon by dilute sulphuric acid with much less vigour than when less pure, and again it was said that phosphorus might be distilled in perfectly pure oxygen. He had never done that himself, but he believed it was a fact stated on excellent authority. If it were so—and there were special difficulties in the interaction of absolutely pure elements,—why should it not be equally possible that even that remarkable chemistry which went on in the human body should not be at times a little more easily brought about by remedies which were not presented to it in the actual state of purity. This was no argument for careless manufacture, but it was as well to remember that they must not strain too far the notion that nothing could be useful unless it were absolutely pure.

Mr. BRANSON said it was well to know that mercurous iodide in a state not fit to dispense could very soon be rendered so. It was the invariable practice in a firm with which he was formerly connected to test the mercurous iodide periodically. Mercuric iodide constantly reformed, although he could not confirm the statement that it formed during the process of washing, but it certainly did form if it were left for some little time.

Mr. KINNINMONT desired to support Mr. Martindale in his idea of giving a formula for this preparation which should be definite, reliable, and practicable. It did not much matter whether it was admitted into the Pharmacopœia or not, for he knew that many physicians had Mr. Martindale's book in their hands more fre-

quently than the Pharmacopœia. He had been very much bothered for years back on the question whether green iodide of mercury should be green or yellow, and had gradually arrived at a process approaching that described, of always having an excess of mercury by which the colour was always greenish rather than yellow. It was no use telling medical men this was not a definite compound. He remembered once, when he was a young man, and rather critical, pointing out to a medical man that a decomposition took place in certain powders which he ordered. His reply was--I daresay you are right, chemically, but I always find that powder answer the purpose. That was unanswerable. It was not always a chemical compound the pharmacist wanted to produce, but something which would produce the therapeutic effect desired. That this article had kept its place for twenty-five years, and was invariably found reliable, he could certify. He could also support Dr. Symes's experience about the mercuric iodide being formed in the process of washing, so much so that he found he could really bring the whole of it into the mercuric state, and after that he refrained from taking any definite quantity as the test for mercuric iodide. He was very glad that Mr. Martindale had brought forward this process, and he did not think it mattered much whether it was in the Pharmacopœia or not.

Mr. ABRAHAM asked if the instability of a number of mercurial preparations, such as mercurial ointment and others, would induce the President to omit them from the Pharmacopœia. The argument that the green iodide, being so unstable, should be omitted, applied equally to the ointment, the pill, and other preparations. The proper remedy was for the pharmacist to make these things himself in small quantities.

Mr. CONROY confirmed what had been said by Mr. Abraham, that the use of absolute alcohol gave a much better result; evaporation was much more rapid, and if the compound were put in a dark place directly, it kept fairly well for some time. With regard to hydrargyrum cum cretâ, he thought that was injured if triturated for a long time, but the present mode of making it was by putting the two ingredients together in a closed bottle and shaking them by mechanical means, by which a much better result was produced.

Mr. WARD said it was important to have some formula for this preparation, which in his own town was very extensively used. In canine treatment for cutaneous affections he had had as much as 4 ounces ordered in an ointment, and as that was

made with lard, it was very important that the colour should be stable. In one particular case, a great dog fancier was most particular to have the ointment green. He said he had had it made up in other places where it had been yellow, and he often asked how it was that he got it green from him, whereas from other places it was yellow. He was glad that this preparation was likely to remain a stable colour, as it would at least prevent these sort of inquiries as to the different appearance of the same thing made up in different places.

Mr. BOTTLE said in his experience the green iodide of mercury had very much gone out of use, and he was glad of it, inasmuch as he thought it was one of the most unstable of preparations. Even with Mr. Martindale's care, he ventured to say that the pill he had handed round contained mercuric iodide, judging by the colour. Dispensing was not all done at West-End establishments, but sometimes in country places this green iodide of mercury had to be dispensed a few times a year, and was the chemist to be called upon to make the preparation each time, in order to keep it in condition? If a man had a few grains of green iodide to dispense, must he make it afresh to get it in condition? Grey powder, again, was a most unstable preparation, and he rejoiced that it was falling into disuse. To have it in proper condition the only way was to shake it in the bottle, and get a small quantity prepared from time to time. A few years ago he was asked to examine a bottle of grey powder which had poisoned two children. It had been sent out to India in a medicine chest, and after being there a few years in a hot climate, it had been completely transformed, and these two children had quite a narrow escape from taking an ordinary and moderate dose of that preparation. They knew that spirit of nitrous ether, and mercurial ointment and pill, all deteriorated by keeping, but it was desirable to expel as much as possible from a Pharmacopœia preparations that notoriously deteriorated the moment they were prepared. He was quite clear that Mr. Martindale's pill had been deteriorated while he was converting the green iodide into the pill mass.

Mr. MACEWAN said one point should not be overlooked in all discussions regarding mercury compounds, viz., that the days of heroic medication had passed, when mercury was given in half-pound doses, and salts of mercury in such quantities as to remain in the skeletons of persons treated therewith, so that mercury globules could actually be shaken out of the bones, at least so tradition stated. Grey powder had undoubtedly in many cases

caused peculiar results on children, for the simple reason that they continued to give the doses that their forefathers did, 2, 3, 4, and 5-grain doses to children. But enlightened physicians now found that doses of one-twenty-fourth and one-twelfth of a grain produced much happier results than large doses. Specialists, such as those Mr. Martindale mentioned, even thought the old dose of green iodide of mercury, 2 to 3 grains, produced a great deal of harm, and for that reason they only gave one-sixth of a grain. Why should large doses be continued when small ones sufficed? He thought this point should be borne in mind by the Pharmacopœia compilers.

Mr. MARTINDALE said he had not tried the use of absolute alcohol, but it was necessary to use alcohol in some form in order to prevent the action being too intense. He had a distinct remembrance as an apprentice being set to rub the two elements, iodine and mercury, together, when volatilization of iodine took place and his nasal organ suffered severely. The heat of combination was so great that great care was necessary, and some alcohol should always be put in at first. That was his deviation from the 1867 directions, and he had no doubt that absolute alcohol would be better than rectified spirit. With regard to the keeping properties, sample *A* was prepared in October, 1887, and it was found to contain only .1 per cent. of mercuric iodide on washing with ether. Sample *B* was prepared on May 19, 1890. *B*₁ had not been tested, but it had much the same colour. If it were carefully stored it might be kept of a uniform green colour without difficulty. Undoubtedly the least exposure to light did in the pills give a surface reduction of the iodide to the state of metallic mercury; it was impossible to prevent light acting upon it. But the preparation was evidently in large and constant demand, and although unstable it was useful. How it acted physiologically he could not offer any opinion, and Dr. Broadbent, at the Birmingham meeting of the British Medical Association, discussed the matter, and even he was somewhat in doubt how the iodide acted in the case of syphilis. This preparation was largely in use in France and America. In France there was a special preparation of pills which had an enormous consumption, and they were also sold largely in England, and if this preparation were omitted from the Pharmacopœia, it only opened the door for these specialities being sold, which he thought would be a pity. With regard to what Mr. Bottle had said, he would merely refer to the samples *A*, *B*, and *C*, and point out that if they contained such a small percentage of mercuric iodide after

three years, it showed they were fairly good preparations. The percentage of mercuric and mercurous iodide was shown on the table, the remainder being principally free mercury which the authorities he had quoted said was no detriment. One of them for the last fifteen years had been very careful to have the pills of a green colour, and they would keep fairly well if placed in amber-tinted bottles. He had avoided the question whether mercurous iodide should be yellow or green, but they were asked for the green preparation, and therefore that should be sent out, though he was not certain that mercurous iodide might not still be yellow. He thought Mr. Wood had hardly made out his point, and that it was still doubtful whether there was such an intermediate preparation as mercurous-mercuric iodide.

The next communication read was on—

CREAM OF TARTAR.

By H. BROADBENT, A.I.C., F.C.S.

Cream of Tartar being a recognised drug of the British Pharmacopœia, and one which every pharmacist handles more or less, and having seen no *recent* communication to the societies or journals on this article, I thought it would be useful and interesting to give the members of this Conference the results of the examination of a great number of samples which have passed through my hands during the last few years.

Cream of tartar, as we all know, consists essentially of acid potassium tartrate; in fact that term is given as a B.P. synonym of the article. But with this salt there is always found a little neutral tartrate of potassium; some calcium tartrate, insoluble matter, and moisture.

In the market there are three or four varieties of cream of tartar, known respectively by the names of the countries which produce them. Thus, we have Italian, French, German, and Spanish, the process of manufacture being very similar in each case, viz., by crystallization and removal of impurities from crude tartar or argols, which are deposited in a crystalline mass during the fermentation of grape juice.

The analysis of cream of tartar presents no difficulties; the following is the method used in all these determinations.

The insoluble matter and moisture were estimated in the usual manner; the acid potassium tartrate was estimated by direct titra-

tion with decinormal soda solution, using phenolphthalein as an indicator.

The normal tartrates of potassium and calcium were found by incinerating a weighed quantity in a platinum crucible, at a *very low heat*, care being taken to obtain complete combustion of the carbon without causing the loss of any alkali.

The mixed carbonates of potassium and calcium were then boiled with water, the insoluble calcium carbonate filtered off; the precipitate then washed, dried, moistened with a few drops of ammonium carbonate, heated to dull redness, and weighed in the usual manner. From the weight of the carbonate we can easily get its equivalent of tartrate.

To the filtrate from the calcium carbonate an excess of decinormal sulphuric acid was added. Boiled, then estimated this excess by means of decinormal soda solution. From this we get the amount of sulphuric acid neutralised by the potassium carbonate, formed *both* from the acid potassium tartrate and from the neutral potassium tartrate, and having found the amount of acid potassium tartrate in the sample, we can reduce this to potassium carbonate. The difference between these two gives us the amount of carbonate formed from the neutral tartrate of potassium, from which we calculate the amount originally existing as neutral potassium tartrate.

Early in this year I published in the *Chemist and Druggist* the results of my work on about forty samples of Italian cream of tartar, and showed that the present average composition was—

Acid Potassium Tartrate . . .	94.11 per cent.
Neutral Potassium Tartrate . . .	1.52 „
Calcium Tartrate . . .	4.02 „
Insoluble Matter . . .	.23 „
Moisture . . .	.27 „

I have not had anything like this number of samples of French cream of tartar, nor of German, but from six analyses of each kind we get the following averages of Spanish cream of tartar; I have only come across one sample, and thus cannot give an average, but this one gave similar results to the ones given above.

	French.	German.
H K T . . .	93.00 per cent.	93.05 per cent.
K ₂ T . . .	1.73 „	1.45 „
Ca T . . .	4.78 „	5.00 „
Insoluble Matter . . .	.28 „	.25 „
Moisture . . .	.30 „	.32 „

Thus we see that cream of tartar, as we now find it in trade, whether it comes from Italy, France, or Germany, has a somewhat definite composition; and if that be so, we are in a position to settle how much calcium tartrate is allowable in a good sample.

Squire, in his latest edition, says it is a general impurity, 2 or 3 per cent. being found even in good samples; whilst Allen, in his work on organic analysis, says the amount varies from 2 to 9 per cent., and any proportion present in excess of 10 per cent. may be considered as an adulterant, whilst the American Pharmacopœia limits the quantity to 6 per cent.

From the above analyses I am of the opinion that this last amount is a very fair limit, and I think it would be an improvement in our own Pharmacopœia, if it was definitely stated the amount of calcium tartrate allowable, and for my own part should limit it to 6 per cent.

This would give a fair margin, and if we allow 1 per cent. for moisture and insoluble matter, which is more than sufficient, it leaves us with 93 per cent. for the two tartrates of potassium, which, according to my analyses, is a standard the manufacturers do attain.

If these or some similar standards should be adopted, it would be infinitely better than the present statement about the presence of lime in cream of tartar, and would remove from one article that ambiguity, preventable or otherwise, which surrounds some of the quantitative tests of the British Pharmacopœia.

My inability to find any published results on this article of more recent date than ten years ago, when Mr. Allen was finding as much as 12·14 per cent. of calcium tartrate, and also that cream of tartar was being systematically adulterated with heavy spar, as well as my desire to have, if possible, a recognised standard for this article, have induced me to lay these results before the Conference.

The PRESIDENT said this was an important subject, and it was well to have a good understanding as to what the cream of tartar of trade should be. The figures clearly showed the wisdom of the editors of the B.P. in stating that cream of tartar should contain about 93 per cent. of true bitartrate of potassium. That left a small margin. It appeared that the percentage was 94 in the Italian and 93 in the French and German, so that the compilers had held the scales very evenly between the chemistry of the sub-

stance and the actual conditions of commerce. A statement by Mr. Allen had also been quoted. Mr. Allen was a public analyst who was very well disposed to pharmacists, and always treated them honourably, and he allowed them a greater margin even than the B.P., viz., from 2 to 9 per cent. A great outcry was made some years since with regard to cream of tartar, but that was a very different matter, and arose through Dr. Paul calling attention to the practice of salting the casks of cream of tartar with sulphate of barium, which was a very serious matter. One per cent. more of tartrate of calcium, if natural to the wine, was not so important. Some people preferred natural products, they preferred wine to spirit and water; but the barium was not natural, and its discovery caused a great sensation. But since then buyers had been on the look out, and he did not know that it had been noticed lately.

Mr. FAIRLEY thought the limits stated by Mr. Broadbent were quite in accordance with the experience of those who examined cream of tartar. In one case he found barium, but not for the last seven or eight years.

Mr. CONROY said he did not exactly remember the figures given in the Pharmacopœia, but he believed 91·8 was the percentage demanded, or about 92. For many years past he had had a good deal of experience in the examination of cream of tartar, and considered the Pharmacopœia standard a very fair one indeed. It was very rare that the percentage of lime exceeded 6. Some years ago, before the time when Dr. Paul drew attention to the matter, he did find some barium, and the singular thing was that barium never existed in a greater proportion than 1 or 2 per cent., and it seemed to him to be an accidental impurity rather than a wilful adulteration, as he thought any one who wished to adulterate cream of tartar would put in more than 2 per cent. At present there was a cream of tartar being sold which was not cream of tartar at all; it was sold chiefly by grocers, and was an acid sulphate of potash, with a certain percentage of starch added to it to bring it down to the same acid strength as natural cream of tartar. It was largely sold in Lancashire, and was used chiefly by bakers for making buns, etc. No doubt the public analysts present had met with samples of it.

The PRESIDENT suggested that possibly this article was sold, not as cream of tartar, but as baking powder.

Mr. CRIPPS said he had given a great deal of attention to this subject of late years, and what Mr. Conroy had mentioned as to

the B.P. standard was very nearly correct. As far as his memory went it was 92.13 calculated on the sample after drying, and therefore it might be considered that it sanctioned a cream of tartar containing about 91 per cent. as the lowest limit of real acid tartrate of potassium. But the test given was not that employed by Mr. Broadbent (the direct saturation of the acid tartrate by alkali), but included also the normal tartrate, if any were present, because the direction was to incinerate and then titrate by acid. In his experience, cream of tartar was very variable. He had examined considerably over 100 samples during the last three or four years, and met with some which contained as little as 80 per cent. of real bitartrate of potassium, and others which contained as much as 95 or 96 per cent. It was pointed out in a paper in the *Pharmaceutical Journal* some two years ago, that if a sample were taken from the top of a cask where there were usually the larger crystals, it gave on an average a result about 2 per cent. higher than a sample taken after the whole had been ground and mixed. This was very important, because if a purchase was made on a sample which assayed at 92, when it was ground up it might not be a B.P. sample at all. Cream of tartar was much better now than two or three years ago, and he believed it varied with the season, for three years ago he had great difficulty in meeting with a sample which when ground would produce a real official article, but this year the difficulty was much less. It was very wise, therefore, that the B.P. allowed of an article containing only 91 per cent. or thereabouts, but in his opinion it might be lowered to 90 per cent. The analyses in the paper were probably not those of samples representing the whole of the cask. Several of the samples referred to in the paper mentioned before were obtained from wholesale and retail houses of business in London and the provinces. No doubt these firms had in the first place procured samples, and bought on the analysis they obtained; but when it was ground it was not up to the standard. As the attention of public analysts was frequently called to this subject, he thought it would be as well to lower the standard to 89 or 90 per cent.

Dr. SYMES asked if sulphate of barium had been found in any of these samples. It was a well known fact that some years ago this substance was constantly found in small quantities, and it would be interesting to know whether the exposure then made had put a stop to this impurity. It was a question with him whether it was really an adulteration or an accidental impurity. It was never a large percentage, and it was a well known fact that one might

examine the upper portion of a cask and find none, but find a small proportion at the bottom.

Mr. HODGKIN said his impression was that the amount of tartrate of lime had nothing to do with the season, and the reason why it decreased was on account of the improved method employed by the manufacturers. He saw no reason for decreasing the standard. One of the objects of the Conference was to maintain a high standard of purity, and this suggestion seemed to be directly contrary to that. If the wholesale druggist were to insist on getting pure cream of tartar, there would be no difficulty in doing so. It was now made abroad almost chemically pure, and the time had come when they ought to seek for a really pure article, instead of retaining useless tartrate of lime in connection with it. With regard to the acid sulphate of potash mentioned, it was generally sold under the name of tartraline, and had nothing to do with cream of tartar at all.

The PRESIDENT said the Conference would be glad to know from Dr. Paul if he remembered the percentage of sulphate of barium which he found present in the cream of tartar of trade. His recollection was that it was much more than 2 per cent.

Dr. PAUL said he did not remember the exact figures, but it amounted to a sensible adulteration. It was found to be caused by the presence of heavy spar, and no reasonable explanation that he could see could be given for the presence of that substance as an accidental mixture with cream of tartar. By shaking the casks so as to get the heavy particles to the bottom, the heavy spar was concentrated to such an extent that the powder at the bottom of the cask contained one-third or more of sulphate of baryta.

Mr. KINNINMONT remarked that the consumption of cream of tartar for medicinal purposes was very small compared with that for baking purposes. A friend of his who used it very largely came to him recently and told him that he could get it 4 per cent. cheaper shipped from Bordeaux. He could not understand how it could be sold at that price, but his friend gave him a sample, and he found a crystalline body in it. He then sent samples for analysis to chemists in Glasgow, and they reported 4 per cent. sulphate of barium. There was a little difficulty in knowing how it got there, but it seemed to him so small that it was not worth while to adulterate the article for the sake of 4 per cent., and it occurred to him it was just possible that it might occur accidentally in the plastering of the wine. He took some trouble to find out whether sulphate of calcium existed along with barium, and it

was so, but he had never settled the question whether it was accidental or not. Still, it was a curious fact that there was 4 per cent. adulteration and 4 per cent. difference in price, so that it looked as if it were done intentionally. However, such an article had disappeared from the trade now altogether.

Mr. G. WARD (Leeds) said he had had some little experience with this article, and thought it would be a mistake to recommend the Pharmacopœia authorities to lower the standard. His experience confirmed the opinion expressed by Mr. Hodgkin, that there was no difficulty in getting pure cream of tartar which would answer the test, if people would pay the price. It was an article which was very much cut, and there was a strong temptation to reduce the quality on account of this great desire to purchase—not the purest article, but the cheapest. But where the purchaser was disposed to pay the proper value, he did not think there was the slightest difficulty in obtaining commercially pure cream of tartar. He could scarcely agree with the criticism as to the statement of the Pharmacopœia, which he thought was sufficiently clear for all purposes. It secured a commercially pure article without insisting on that which would be very difficult to obtain, unless it were specially prepared. He thought that 92 per cent. of tartrate was not too much to demand from the manufacturer. With regard to the presence of sulphate of barium, at first sight it might be supposed that it might come from the treatment of the wine, as they knew that sulphate of barium and kaolin were frequently used to assist the deposition and clarifying of the wines, but that would not account for sulphate of barium in cream of tartar, because that was a purified product, and the sulphate of barium if used for plastering the wine would not be present in the finished product. He thought, therefore, that its presence was a clear indication that it had been added intentionally for fraudulent purposes.

Mr. ABRAHAM asked if it might be taken that all these samples were free from adulteration; and secondly, what percentage of pure tartrate of potassium could be obtained by filtering the solution while hot, and thus taking out the impurities. That was a means of purification, probably efficient enough for pharmaceutical purposes. If an article can be obtained by that means having 95 or 96 per cent. of cream of tartar, they might regard it as sufficiently pure.

Mr. BROADBENT, in reply, said the answer to Mr. Abraham's question whether the samples were free from adulteration de-

pended on how the Pharmacopœia was read. He should say they were free. Mr. Abraham also wanted to know what degree of purity could be obtained. That week he had had a sample which was guaranteed to be 100 per cent. of bitartrate, and it was actually 99·6, but the price was just half as much again as that of the other. With regard to barium sulphate, he saw that Mr. Allen found about 2 per cent., and he did not remember hearing of more than 1 or 2 per cent. In most of these analyses the insoluble matter was only 0·3, which clearly showed the absence of all barium sulphate, his insoluble matter being a little calcium tartrate and silica.

The PRESIDENT asked if the acid tartrate of potassium which was guaranteed to be 100 per cent. was natural cream of tartar, or was it chemically produced by tartaric acid and potash salts.

Mr. BROADBENT said it was guaranteed 100 per cent., and was chemically prepared.

An abstract of the following paper was then given, the principal formulæ being shown on a blackboard :—

THE CONSTITUTION OF SYNTHETIC REMEDIES EXPLAINED FROM A CHEMICAL POINT OF VIEW : SHOWING THEIR RELATIONSHIP ONE TO ANOTHER.

By JOHN HODGKIN, F.L.S., F.I.C., F.C.S.

Amidst the marvellous developments of chemistry, through the appreciation and direct application of Kekulé's theory of the "benzene ring," must be reckoned that series of coal-tar derivatives which is playing a not unimportant part in modern therapeutics.

The systematic nomenclature of such bodies is, however, most cumbersome and inconvenient for the use of medical men and others engaged in handling these bodies. It has therefore been found generally useful to bestow upon them new names, which, as a rule, express rather the object that is supposed to be obtained by their use, than to call them by their true chemical names, which are however directly expressive to the student of modern chemistry. But by using these adopted fancy names it too often happens that we lose sight of the real relationship existing between bodies of analogous and allied constitutions, the connection being absolutely

hidden under the fancy name, though easily recognised when examined from its chemical standpoint.

It occurred to me, therefore, that it might be perhaps of permanent interest if such bodies were arranged under their proper chemical groups and sub-divisions; and I, therefore, in the paper which I have the honour to lay before this Conference, propose to attempt this, and to point out in as simple a way as I can, the differences and connections between the chief synthetic remedies that are now employed in medicine.

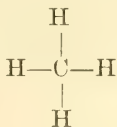
The synthetic remedies that we now employ may be divided into two great groups; those, such as Chloroform, Paraldehyde, Sulphonal, etc., which belong to the series of Methanes and Aldehydes, and those such as Antifebrin, Antipyrin, Exalgin, β -Naphthol, Thallin, etc., which belong to the Aromatic series. As the methane and aldehyde series includes compounds such as Chloroform, which occupy an earlier position in the history of synthetic remedies, I propose to deal briefly with this series first. Speaking generally, this series contains the Anæsthetics, and Hypnotics; the Aromatic series, containing the Antipyretics, Antiseptics, etc. There are, of course, exceptions to this classification, but this division may be taken as being fairly correct.

The way in which I shall indicate the constitution of these bodies is by what are known as graphic formulæ, which serve to express very well, in one plane, the formation and structure of such bodies.

PART I.

The bodies belonging to the first series can be written on two types, viz., MARSH GAS, CH_4 , and FORMIC ALDEHYDE, CH_2O .

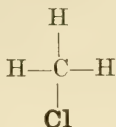
MARSH GAS or METHANE consists of *four* atoms of hydrogen, a monovalent element, united to *one* atom of carbon, a tetravalent element. They are supposed to be united thus:—



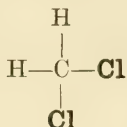
Each of these four atoms of hydrogen is capable of being replaced by other monovalent elements or groups.

Now, if you replace one of these hydrogens (written by the

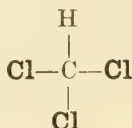
symbol H) by chlorine (written Cl), you obtain *Methyl chloride*, $\text{C H}_3 \text{Cl}$, of which the graphic formula is written thus:—



If two atoms of H are replaced, you obtain *Methylene chloride*, $\text{C H}_2 \text{Cl}_2$.

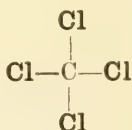


If you replace three hydrogens by chlorine, you obtain *Chloroform*, C H Cl_3 ,



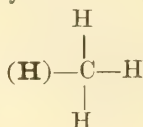
Bromoform and *Iodoform* are exactly analogous, bromine and iodine respectively taking the place of the chlorine.

If you replace all the hydrogens by chlorine, you obtain *Tetrachloride of carbon*, C Cl_4 :—

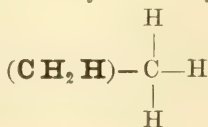


Marsh gas, as well as being considered as methane, C H_4 , may be considered as a *Hydride of methyl*, C H_3 , the most elementary of alcohol radicles: thus $\text{C H}_3 \cdot \text{H}$. If you take the next body in this series, *i.e.*, by adding C H_2 to it, you obtain *Hydride of ethyl*, $\text{C}_2 \text{H}_5 \cdot \text{H}$. Thus:—

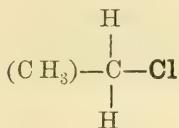
Hydride of methyl.



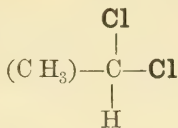
Hydride of ethyl.



If you substitute a chlorine atom for one of the free hydrogens, you obtain *Ethyl chloride*, $C_2H_5 \cdot Cl$; but if two H atoms are replaced, you obtain *Monochlorethyl chloride* or *Ethylidene chloride*. Thus:—



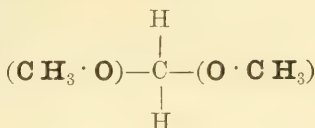
Ethyl chloride.
 $C_2H_5 \cdot Cl$



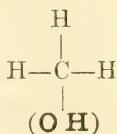
Ethylidene chloride.
 $C\ H_3 \cdot C\ H \cdot Cl_2$

This latter compound is isomeric with ethylene chloride, $C_2H_4 \cdot Cl_2$, or Dutch liquid.

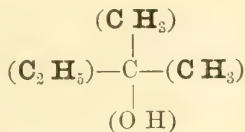
If you replace two of the H atoms in marsh gas by the groups $(O \cdot CH_3)$, you obtain *Methylal*. Thus:—



If you replace one H in marsh gas by the group OH, called hydroxyl, you obtain *Methyl alcohol* (wood spirit), called also *Carbinol*.



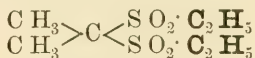
and if you replace the three remaining H atoms by two groups of CH_3 , and one of C_2H_5 you obtain *Amylene hydrate*, called also tertiary amyl alcohol, or ethyldimethyl carbinol.



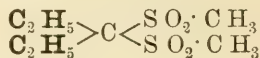
Now if you take this group and add an SO_2 group to the ethyl group, making $C_2H_5 \cdot SO_2$, and then replace the OH group by a similar $C_2H_5 \cdot SO_2$ group, you obtain *Sulphonal*, or diethyl-sul-

phone-dimethyl-methane, $C(CH_3)_2(C_2H_5 \cdot SO_2)_2$. *Reversed sulphonal* has two plain ethyl groups and two methyl-sulphone groups instead. *Trional* has three ethyl groups, whilst *Tetronal* has four ethyl groups.

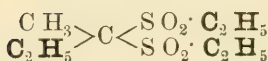
This is a most interesting series from a chemico-physiological point of view, the hypnotic action having been alleged to directly increase as the number of ethyl groups is raised. The Sulphonals are thus represented:—



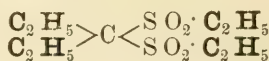
Sulphonal.



Reversed Sulphonal.

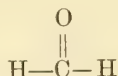


Trional.

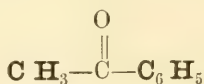


Tetronal,

We now come to the bodies that can be written on the second type, namely, FORMIC ALDEHYDE:—

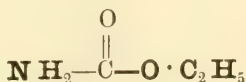


The first member is *Hypnone*, or *Phenyl-methyl-ketone*, i.e. to say, formic aldehyde in which one H is replaced by the group phenyl, C_6H_5 , and the other by methyl. Thus:—



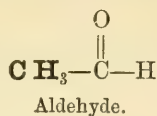
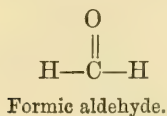
[This is not an aldehyde, although it can be written on this type; it is in reality a ketone, i.e., a body which consists of two alcoholic radicles united by a CO group.]

Urethane, or *Ethyl carbamate*, is the COH_2 group in which one H is replaced by amidogen NH_2 , and the other by an oxyethyl group:—



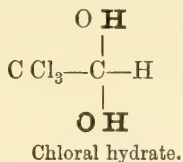
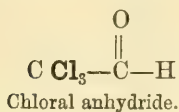
A further derivative of urethane is *Ural*, or *Uralium*, but before we can consider this, we must turn to the aldehyde group.

Ordinary *Aldehyde*, $\text{C H}_3 \text{C O H}$ or $\text{C}_2 \text{H}_4 \text{O}$, is the next in the series to formic aldehyde, a C H_3 group replacing the H thus :—

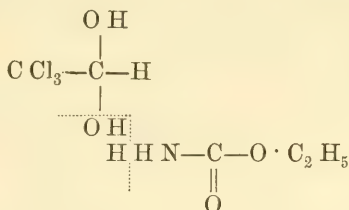


Paraldehyde and *Metaldehyde* are what are known as polymerides of aldehyde, *i.e.* to say, they are of the same percentage composition but of different vapour densities.

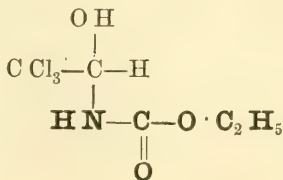
If you replace the three hydrogens in the methyl C H_3 group, by chlorine, you get *Chloral anhydride*, or trichloraldehyde, $\text{C Cl}_3 \text{C O H}$, and if you hydrate this, *i.e.*, add one molecule of water, you obtain *Chloral hydrate* $\text{C Cl}_3 \text{C (O H)}_2 \text{H}$. Thus :—



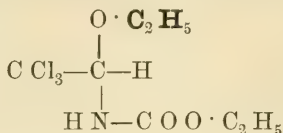
Ural is a compound of chloral hydrate and urethane, the bodies under suitable conditions combining, with the elimination of water. Thus :—



The carbon is tacked on to the nitrogen of urethane, forming *Ural*. Thus :—

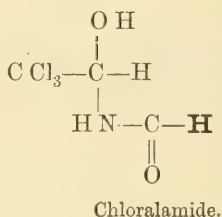
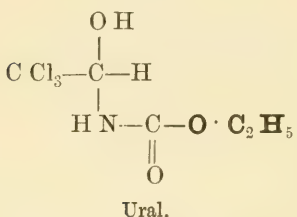


Somnal is another urethane derivative, being *Ural* in which the hydrogen in the O H group is replaced by ethyl.

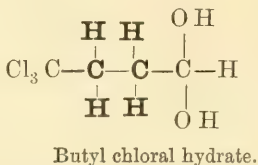
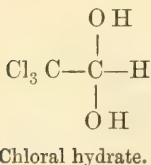


The Germans call it "ethylirtes chloralurethan," or ethylated chloral urethane.

Starting again from formic aldehyde, C O H_2 , if we replace one of the H atoms by the group N H_2 , amidogen, we obtain *Formamide*, $\text{C O} \cdot \text{N H}_2 \cdot \text{H}$, and if we combine this with chloral anhydride, we obtain *Chloralamide*, which is similar to *Ural*, with the exception that the oxy-ethyl group is replaced by H. Thus:—



Butyl chloral hydrate (*Croton chloral hydrate*) is of course analogous to ordinary chloral hydrate, the difference being the addition of two C H_2 groups. Thus:—



Bromal hydrate is, of course, exactly analogous to chloral hydrate, bromine atoms replacing the chlorine.

PART II.

THE AROMATIC SERIES.

As regards the aromatic series of synthetic remedies, it may for our purposes be divided into two great groups, the *Benzene*, C_6H_6 , and the *Naphthalene*, $C_{10}H_8$, which may be again sub-divided as follows:—

Benzene. Group I.

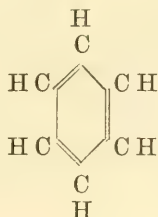
Aniline, benzoic acid, and phenol derivatives.

Naphthalene. Group II.

Naphthylamine, naphthoic acid, naphthol, and quinoline derivatives.

I shall deal first with the Benzene or (benzol) group, as it comes first from a chemical point of view. And as some of you may not be intimately acquainted with Kekulé's benzol-ring theory, it will perhaps be better to explain it briefly in order that you may be better able to follow the changes that I shall indicate.

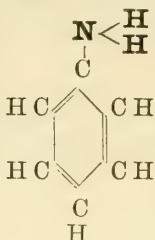
Benzol or benzene consists of six atoms of carbon, a tetravalent element, and six atoms of hydrogen, a monovalent element, *i.e.*, C_6H_6 . Professor Kekulé, just twenty-five years ago, conceived the brilliant notion of representing this body by a graphic formula, which might explain for all general purposes its structure. The formula he chose was a hexagon, drawn as follows:—



which shows the carbon atoms united to one another by one and two bonds alternately, the hydrogen being united to the carbons by a single bond: the desires of each element are thus completely satisfied. Each of the six hydrogen atoms is capable of replacement by a monovalent group or radicle, and under suitable conditions a carbon can be replaced.

Now by employing this hexagon, or benzene ring, as it is called, you will be able to follow with great ease the structural differences of these synthetic remedies, as element or group is substituted to form fresh compounds.

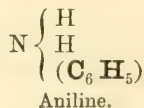
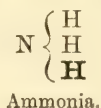
The first subdivision of the benzol group consists of those bodies which are derived from *Amidobenzene* or *Aniline*.



Note.—For convenience sake and for greater distinctness, I shall leave out the symbols for carbon and hydrogen, where they do not differ from the original benzene hexagon, and only fill in those which show the replacements: for example, the abbreviated formula for aniline will then be as follows:—

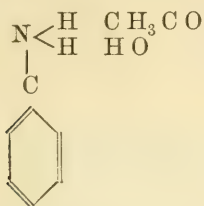


Aniline may be regarded as benzol, C_6H_6 , in which one H is replaced by amidogen, NH_2 . It may therefore be called *Amidobenzene*, or *Phenylamine*, Phenyl being the group C_6H_5 , and benzol being theoretically its hydride, $\text{C}_6\text{H}_5\cdot\text{H}$; or *Aniline* may be considered as ammonia, NH_3 , in which one H is replaced by phenyl, so that aniline may be considered an organic ammonia, and in fact it is, both from its behaviour and its constitution.

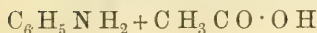


The hydrogens in the NH_2 group in aniline are both replaceable by monovalent radicles; so that if you act upon aniline under

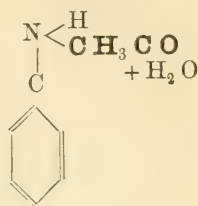
suitable conditions you replace one hydrogen by the monovalent group acetyl, CH_3CO , obtaining *Acetanilid*, or *Phenylacetamide*, known as *Antifebrin*.



Aniline + Acetic acid.



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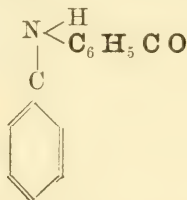


Acetanilid + Water.

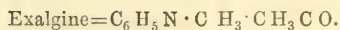
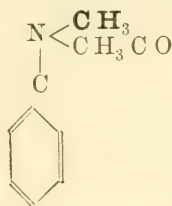
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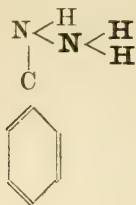
If instead of using acetic acid, and thus replacing the H by acetyl, you used benzoic acid, you would substitute benzoyl, forming *Benzanilide*, $\text{C}_6\text{H}_5 \cdot \text{NH} \cdot \text{C}_6\text{H}_5\text{CO}$.



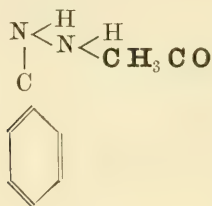
If the residual hydrogen in the NH_2 group be replaced by methyl, CH_3 , we get *Methylacetanilid*, or *Exalgine*.



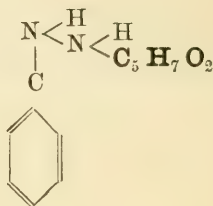
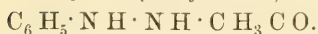
If instead of replacing the H in the NH_2 group in aniline by bodies such as acetyl, benzoyl or methyl, we replace it by a second amidogen group, we obtain a body known as *Phenylhydrazine*, $\text{C}_6\text{H}_5 \cdot \text{NH} \cdot \text{NH}_2$. Thus:—



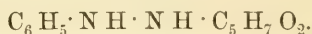
From this body both *Pyrodin* and *Antithermin* are derived. *Pyrodin* is acetyl-phenylhydrazin, or phenylhydrazin in which one of the replaceable hydrogens in the new N H₂ group is replaced by acetyl, whilst *Antithermin* is the product of the reaction of levulinic acid upon phenylhydrazin, so that it may be considered as levulinyl-phenyl-hydrazin.



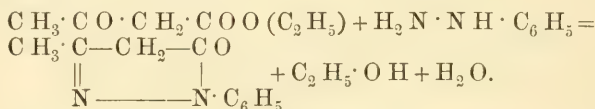
Pyrodin (or Hydracetin).



Antithermin.

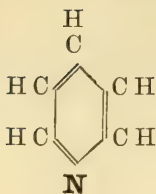


We now come to a much more complex body, viz., *Antipyrin*, which must, however, be regarded a derivative of phenyl-hydrazin. If you act upon phenyl-hydrazin with aceto-acetic ether, condensation takes place with elimination of water and alcohol, and a new body, originally called methyl-oxychinizin, but now called phenyl-monomethyl pyrazolon, is formed. The equation may be represented thus :—



By heating this body with methyl iodide, C H₃ I, and methyl alcohol, C H₄ O, to 100° C., a fresh methyl group is introduced, and we get *Phenyl-dimethyl-pyrazolon*, or *Antipyrin*.

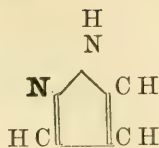
The theoretical derivation from pyrazol is thus well explained in an editorial note in the *Pharmaceutical Journal*, 1887, April 30, p. 888. Pyrazol is represented as the type of a new class of bodies standing in the same relation to pyrrol as pyridine to benzol, thus:



Pyridine.



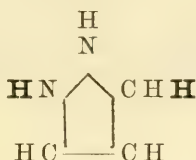
Pyrrol.



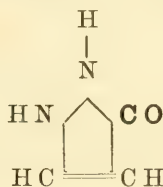
Pyrazol.

A CH group in pyrrol being replaced by nitrogen to form pyrazol. The successive reactions are then supposed to be as follows:—

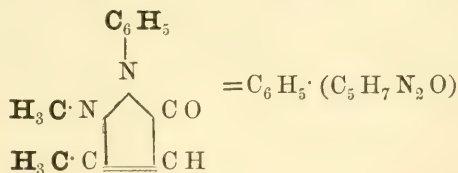
Pyrazin, a dihydride, is first formed.



Then a CH₂ group is replaced by CO, the product being *Pyrazolon*.



and then two hydrogens are successively replaced by methyl groups, forming *Dimethyl-pyrazolon*, and then the H attached to the top N is replaced by phenyl, C₆H₅, forming

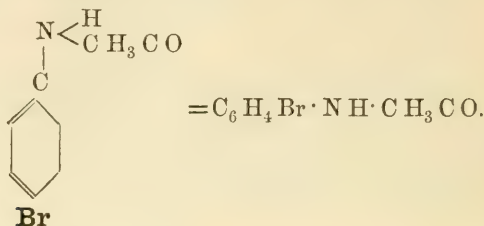


Phenyl-dimethyl-pyrazolon, or *Antipyrin*.

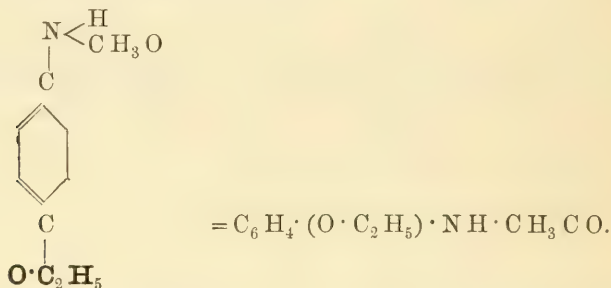
So far we have been considering aniline derivatives, in which the differences lay in the replacements of hydrogen in the NH₂ group. We may now consider four compounds; viz., antiseptin, methacetin, phenacetin, and methyl-phenacetin; in which the base,

so to speak, is an aniline, in whose benzol ring a H has been replaced by another monovalent group or element.

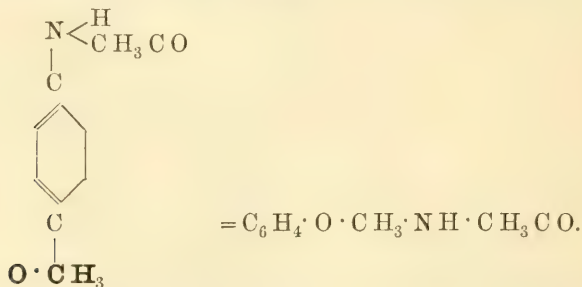
The first is *Antiseptin*, or *Para-monobromo-acetanilide*; i.e., anti-febrin or acetanilide, in which the H in the para position is replaced by bromine. Thus:—



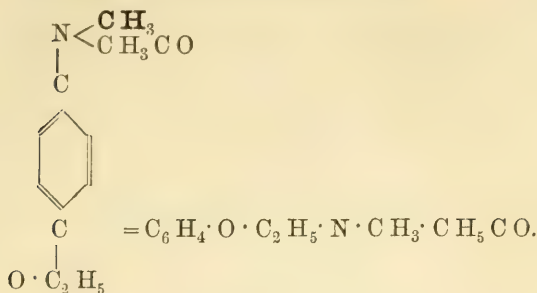
The next is *Phenacetin* or *Para-acet-Phenetidin*. This is practically acetanilide again, with the exception that the para H is replaced by an oxy-ethyl group. Thus:—



If we replace the oxy-ethyl group by an oxy-methyl group, we obtain *Methacetin* or *Para-acetanisidin*.

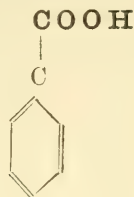
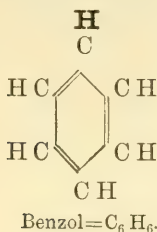


If we replace the residual H in the N H₂ group in phenacetin by CH₃, we obtain *Methyl-Phenacetin*.

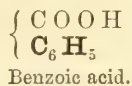


The next series that claims our attention is the benzoic acid series.

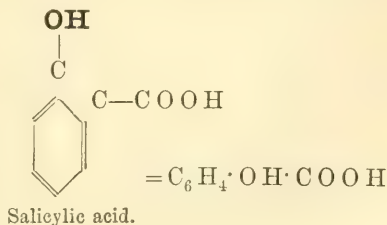
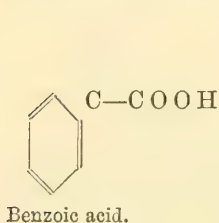
Benzoic acid is benzol in which one hydrogen is replaced by the group C O O H , or carboxyl. Thus:—



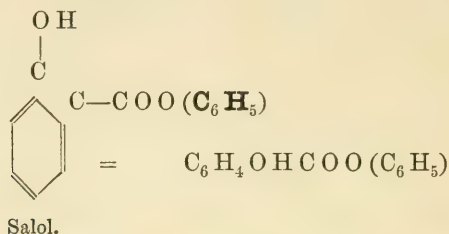
This is the simplest of all the benzol series of acids, as formic acid is in the fatty acid series; it may, in fact, be regarded as formic acid in which the H is replaced by phenyl. Thus:—



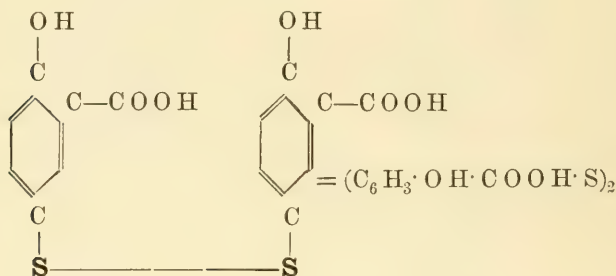
Now if we replace by hydroxyl, O H , one of the hydrogens next to the carbon to which the C O O H group is attached, we obtain *Ortho-oxybenzoic acid* or *Salicylic acid*. Thus:—



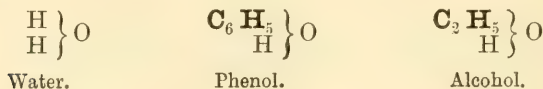
If we replace the H in the C O O H group by phenyl, C_6H_5 , we obtain *Salol* or *Phenyl salicylate*. Thus:—



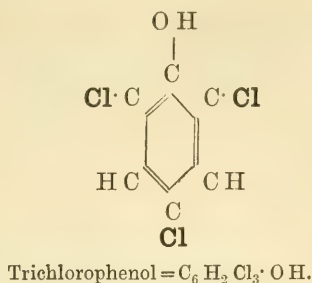
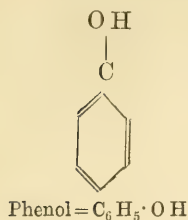
Another salicylic acid derivative is *Dithio-Salicylic acid*. This is two molecules of salicylic acid in which the para hydrogens are each replaced by an atom of sulphur, which are also connected to one another. Thus:—



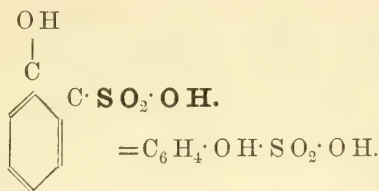
The third sub-division of the benzol series is that of the *Phenol* derivatives. *Phenol* is benzol in which one H is replaced by hydroxyl, OH, and may be considered as water H_2O in which one H is replaced by phenyl C_6H_5 . It is thus analogous to alcohol, which is water in which one H is replaced by ethyl. Thus:—



Under suitable conditions three of the H atoms in phenol can be replaced by chlorine in alternate positions, forming *Trichlorophenol*. Thus:—

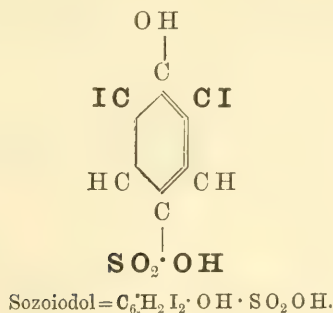


By acting upon phenol with sulphuric acid you can replace a H in the ortho position by the group SO_3H , forming *Ortho-phenol-sulphuric acid*, known in a 33 per cent. solution as *Aseptol* or *Sozolic acid*.



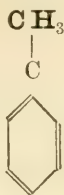
Aseptol or Sozolic Acid.

Whilst if instead of replacing the *ortho* H you replace the *para* H by (SO_2OH) , and then replace both the *ortho* hydrogens by iodine, you obtain *Di-iodo-para-phenol-sulphonic acid* or *Soziodol*. Thus :—

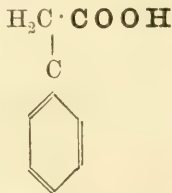


This body must not be confounded with *Iodol*, with which it has no connection, as will be seen later on.

Starting again from benzol, if you replace a H by a methyl group you obtain Toluene (or Toluol) :—



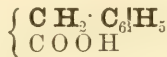
If you replace a H in this methyl group by carboxyl, COOH, you obtain *Alphatoluic acid* :—



This is also called *Phenylacetic acid*, for it may be regarded as ordinary acetic acid in which one of the hydrogens is replaced by phenyl, thus :—

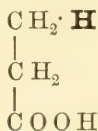


Acetic acid.

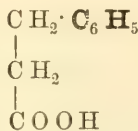


Phenylacetic acid.

The next acid in the series used in medicine is *Homotoluic acid*, also called *Hydrocinnamic* or *Phenylpropionic acid*, since it may be regarded as propionic acid in which a H in the CH₃ group is replaced by phenyl. Thus :—

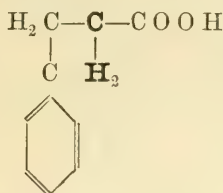


Propionic acid.



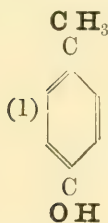
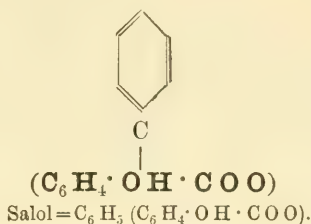
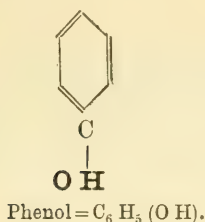
Phenylpropionic acid.

Its graphic formula is represented thus :—



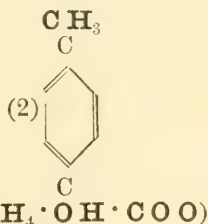
Homotoluic acid = $\text{C}_6\text{H}_5 \cdot \text{CH}_2 \cdot \text{CH}_2\text{COOH} = \text{C}_9\text{H}_{10}\text{O}_2$.

The phenol of toluene is called *Cresol*, and the salicylate of the *para* variety is called *Cresalol*, and is analogous to salol in its structure, thus :—

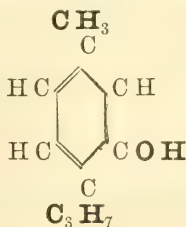


(1) Para-cresol = $\text{C}_6\text{H}_4\text{CH}_3\text{OH}$.

(2) Cresalol = $\text{C}_6\text{H}_4\text{CH}_3 (\text{C}_6\text{H}_4 \cdot \text{OH} \cdot \text{COO})$.



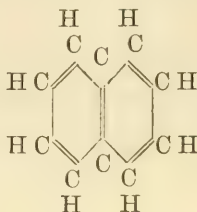
Thymol is a further derivative, having in addition to the CH and OH groups, a propyl group C_3H_7 , arranged as follows :—



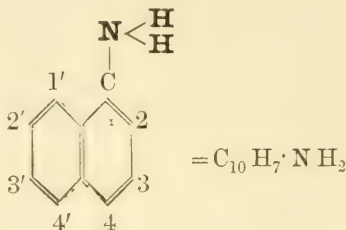
Aristol is an iodine derivative of thymol, but its constitution is not yet settled.

We now come to the second great division, namely, the Naphthalene series.

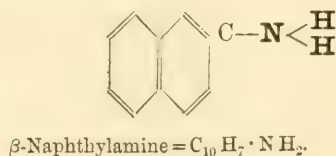
Naphthalene, $C_{10}H_8$, is the next highest body in the benzol series, and consists of ten atoms of carbon and eight of hydrogen. This is represented by a double hexagon, thus:—



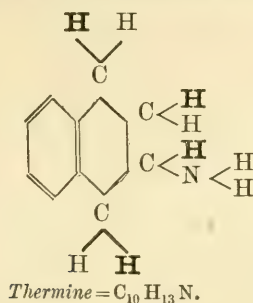
The first sub-division of the naphthalene group consists of the naphthylamines, corresponding to the phenylamines. You will remember that the first body in the benzol series, was one in which one H was replaced by NH_2 , forming phenylamine or aniline. So the first body in this group is *Naphthylamine*, $C_{10}H_7NH_2$, written thus:—



This is called *alpha* Naphthylamine, because the replacement of the amidogen group has been effected in what is called an *alpha* position. The *alpha* positions are those numbered 1, 1' and 4, 4' on the graphic formula above, whilst if the substitution takes place at 2, 2', 3 or 3', the body becomes a *beta*-compound, so that *beta*-Naphthylamine is written thus:—

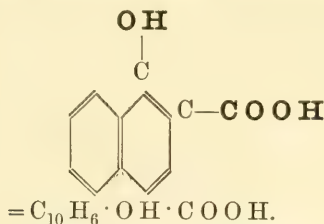


Now, if you take this body and add four hydrogens to that hexagon in which the NH_2 group has been produced, you obtain *Tetra-hydro- β -naphthylamine* or *Thermine*, a body which is reputed to raise the temperature of the human body instead of reducing it.



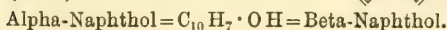
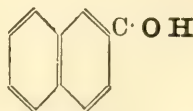
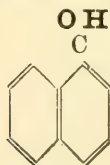
You will doubtless notice that the carbons in the ring in which the replacements and additions have taken place, are no longer united by double bonds, but are joined by single bonds, the bonds that are thus set free being satisfied by hydrogen.

The next sub-division consists of the *Naphthoic acid series*, which is analogous to the benzoic acid group. The acid directly analogous to benzoic acid is alphanaphthoic acid, $\text{C}_{10}\text{H}_7 \cdot \text{COOH}$, but at present I am not aware that this has been used in pharmacy. The corresponding acid to salicylic acid is *alpha-oxy-naphthoic acid*.

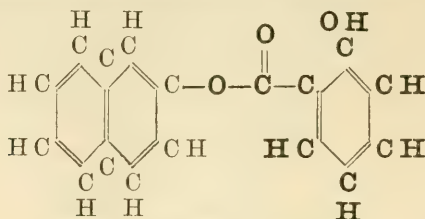


This is really α -oxy- β -naphthoic acid, which is a β -naphthoic acid derivative.

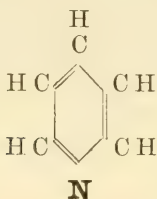
The corresponding bodies to phenol are *alpha* and *beta*-naphthol.



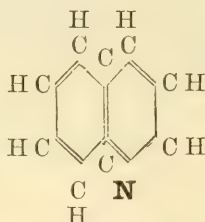
Now, if you take β -naphthol and substitute the group $C_6H_4 \cdot OH \cdot COO$ for the OH group, you obtain *Salicylate of β -naphthol*, or *Betol*, which is thus analogous to salol and cresolol.



We now come to a rather complicated series of bodies which are derived from *Quinoline*, C_9H_7N . You will remember when dealing with antipyrin that pyridine, C_5H_5N , was referred to. Now, if you replace a CH in naphthalene, $C_{10}H_8$, by a nitrogen atom, you obtain quinoline. The relation between this and pyridine being thus shown :—

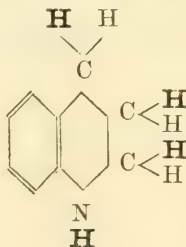


Pyridin, C_5H_5N .

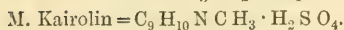
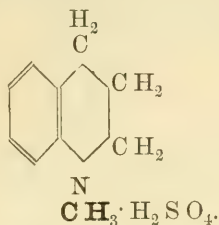


Quinoline, C_9H_7N .

It is necessary to refer to this since quinoline, or chinoline, is the starting point for a great many important bodies. The hexagon in which the N is replaced is known as the pyridine ring. Under suitable conditions four hydrogens can be added to this pyridine ring, forming *Tetra-hydroquinoline*, $C_9H_{11}N$,



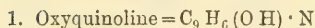
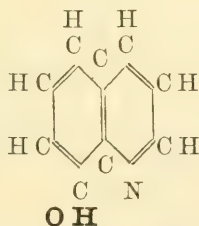
and if you replace the nitrogen-hydrogen by methyl, and make the sulphate of this body, you have *M. Kairolin*.



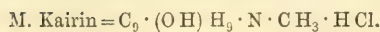
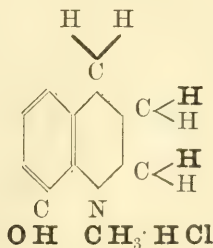
The M stands for methyl, the ethyl compound, or *A. Kairolin*, being distinguished by an A for Aethyl—the German mode of spelling ethyl.

M. Kairin and *A. Kairin* resemble the kairolins, differing in having an OH group in the benzol nucleus, and in being hydrochlorates instead of sulphates. The kairins are really derived from—

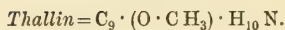
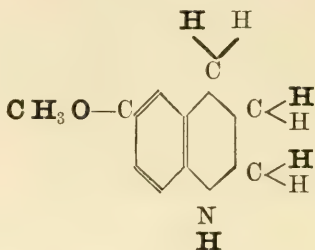
1. Oxyquinoline—



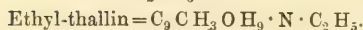
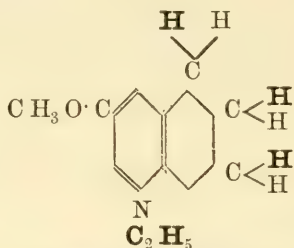
which is a derivative of quinoline. The formula for the *M. Kairin* is written thus:—



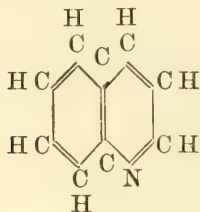
Starting again from quinoline, if we replace the para-hydrogen in the benzol group by ($\text{O} \cdot \text{C} \text{H}_3$) we obtain *Parachinanisol*, and if we add four hydrogens to the pyridine ring, as before, we obtain *Tetra-hydroparachinansol*, or *Thallin*.



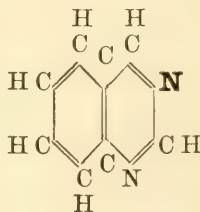
Thallin is generally used as the sulphate. If we substitute ethyl for hydrogen in the NH group, we obtain *Ethyl-tetra-hydroparachinanisol* or *Ethyl-thallin*.



A further derivative of quinoline is *Orexin*; this is derived through a body called *Chinazoline*, which is quinoline in which a further $\text{C} \text{H}$ group has been replaced by nitrogen. Thus:—

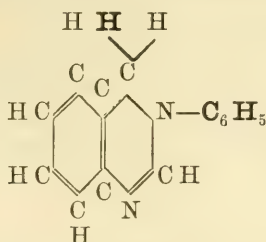


Quinoline, $\text{C}_9 \text{H}_7 \text{N}$.

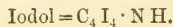
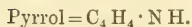
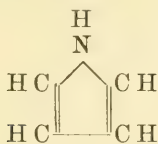


Chinazoline, $\text{C}_8 \text{H}_6 \text{N}_2$.

The variety of chinazoline here shown is the *meta*, and *Orexin* is *Phenyl-dihydrochinazoline*, that is to say, meta-chinazoline in which a hydrogen has been added to the CH group in the para position, and a phenyl-group to the N in the meta position. Thus:—



The last body that I shall mention is *Iodol*, which is tetra-iodo-pyrrol, that is to say, *Pyrrol* in which the four carbon hydrogens are replaced by iodine. Thus:—



You may remember that pyrrol was referred to when speaking of antipyrin, as being the starting-point of one of its theoretical derivations.

Pyrrol and its derivatives form a special group by themselves, but as there was only this one derivative (*Iodol*), I did not think it worth while to enumerate the pyrrol type as a special class.

I have now come to the end of the description of the more important synthetic remedies. There are many others that will doubtless occur to the well-informed pharmacist that are not here alluded to, but I hope that my endeavours will enable several of you to look at these bodies in a new light, and to realize that these graphic formulæ really help us to understand these new bodies, and to perceive the relationship that exists between bodies of an allied constitution.

As Messrs. Martindale and Westcott point out in the preface to the sixth edition of their "*Extra Pharmacopœia*," "the current of pharmacology seems to be following the course of modern

chemistry through the intricacies of the endless series of derivatives obtained from coal tar and various alcohols," and if I, by means of this paper, shall have been able to elucidate any of these difficulties, and to put facts into a more tangible and intelligible form for the benefit of the members of this Conference, I shall feel that my labour of love has borne good fruit.

NOTE.—It must not be assumed that the replacements mentioned in this paper are always those which actually occur in making fresh bodies; they are simply to show the differences from a structural point of view that exist between the type and the derivative.

APPENDIX.

Single-line formulæ, showing the constitution of the synthetic remedies mentioned.

1. *Methanes and Aldehydes.*

Marsh gas	C H_4 .
Methyl chloride . .	$\text{C H}_3 \text{ Cl}$.
Methylene chloride.	$\text{C H}_2 \text{ Cl}_2$
Chloroform	C H Cl_3
Tetrachloride of carbon	C Cl_4 .
Ethyl chloride . . .	$\text{C} \cdot \text{H}_2 (\text{C H}_3) \cdot \text{Cl}$.
Ethylidene chloride	$\text{C H}_3 (\text{C H Cl}_2)$.
Methylal	$\text{C} \cdot \text{H}_2 \cdot (\text{C H}_3 \text{ O})_2$.
Methyl alcohol . . .	$\text{C} \cdot \text{H}_3 \cdot (\text{O H})$.
Amylene hydrate . .	$\text{C} \cdot (\text{C H}_3)_2 \cdot (\text{C}_2 \text{ H}_5) \cdot (\text{O H})$.
Sulphonal	$\text{C} \cdot (\text{C H}_3)_2 \cdot (\text{S O}_2 \cdot \text{C}_2 \text{ H}_5)_2$.
Reversed sulphonal	$\text{C} \cdot (\text{C}_2 \text{ H}_5)_2 \cdot (\text{S O}_2 \cdot \text{C H}_3)_2$.
Trional	$\text{C} \cdot (\text{C H}_3) (\text{C}_2 \text{ H}_5) (\text{S O}_2 \cdot \text{C}_2 \text{ H}_5)_2$.
Tetronal	$\text{C} \cdot (\text{C}_2 \text{ H}_5)_2 (\text{S O}_2 \cdot \text{C}_2 \text{ H}_5)_2$.
Formic aldehyde . .	$\text{C} : \text{O} (\text{H}_2)$.
Hypnone	$\text{C O} (\text{C H}_3) (\text{C}_6 \text{ H}_5)$.
Urethane	$\text{C O} (\text{N H}_2) (\text{O} \cdot \text{C}_2 \text{ H}_5)$.
Aldehyde	$\text{C O} (\text{C H}_3) \text{ H}$.
Chloral anhydride . .	$\text{C O} (\text{C Cl}_3) \text{ H}$.
Chloral hydrate . . .	$\text{C} (\text{O H})_2 (\text{C Cl}_3) \text{ H}$.
Ural	$\text{C} (\text{O H}) [\text{C O} (\text{N H}) (\text{O} \cdot \text{C}_2 \text{ H}_5)] (\text{C Cl}_3) \text{ H}$.
Somnal	$\text{C} (\text{O} \cdot \text{C}_2 \text{ H}_5) [\text{C O} (\text{N H}) (\text{O} \cdot \text{C}_2 \text{ H}_5)] (\text{C Cl}_3) \text{ H}$.
Chloralamide	$\text{C} (\text{O H}) [\text{C O} (\text{N H}) \text{ H}] (\text{C Cl}_3) \text{ H}$.
Butyl chloral hydrate	$\text{C} (\text{O H})_2 [(\text{C H}_2)_2 (\text{C Cl}_3)] \text{ H}$.

{2. *Aromatic Series.*

Benzol	$C_6 H_6$.
Aniline	$C_6 H_5 \cdot N H_2$.
Acetanilide	$C_6 H_5 \cdot N H \cdot C H_3 C O$.
Benzanilide	$C_6 H_5 \cdot N H \cdot C_6 H_5 C O$.
Exalgine	$C_6 H_5 \cdot N (C H_3) \cdot C H_3 C O$.
Phenyl-hydrazine	$C_6 H_5 \cdot N H \cdot N H_2$.
Pyrodin	$C_6 H_5 \cdot N H \cdot N H \cdot C H_3 C O$.
Antithermin	$C_6 H_5 \cdot N H \cdot N H \cdot C_5 H_7 O_2$.
Antipyrin	$C_6 H_5 \cdot (C_5 H_7 N_2 O)$.
Antiseptin	$C_6 H_4 Br \cdot N H \cdot C H_3 C O$.
Phenacetin	$C_6 H_4 (O \cdot C_2 H_5) \cdot N H \cdot C H_3 C O$.
Methacetin	$C_6 H_4 (O \cdot C H_3) N H \cdot C H_3 C O$.
Methyl-phenacetin	$C_6 H_4 (O \cdot C_2 H_5) \cdot N (C H_3) \cdot C H_3 C O$.
Benzoic acid	$C_6 H_5 \cdot C O O H$.
Salicylic acid	$C_6 H_4 (O H) \cdot C O O H$.
Salol	$C_6 H_4 (O H) \cdot C O O (C_6 H_5)$.
Dithiosalicylic acid	$(C_6 H_3 O H \cdot C O O H \cdot S)_2$.
Phenol	$C_6 H_5 \cdot O H$.
Trichlorophenol	$C_6 H_2 Cl_3 \cdot O H$.
Aseptol	$C_6 H_4 O H \cdot S O_2 O H$.
Sozoidol	$C_6 H_2 I_2 O H \cdot S O_2 O H$.
Toluol	$C_6 H_5 \cdot C H_3$.
Alpha-toluic acid	$C_6 H_5 \cdot C H_2 (C O O H)$.
Homo-toluic acid	$C_6 H_5 \cdot C H_2 \cdot C H_2 (C O O H)$.
Cresol	$C_6 H_4 C H_3 \cdot O H$.
Cresalol	$(C_6 H_4 \cdot C H_3) O O C \cdot C_6 H_4 O H$.
Thymol	$C_6 H_3 \cdot C H_3 \cdot C_3 H_7 \cdot O H$.
Aristol	(Iodine derivative of Thymol).
Naphthalene	$C_{10} H_8$.
Naphthylamine	$C_{10} H_7 \cdot N H_2$.
Thermin	$C_{10} H_7 \cdot H_4 \cdot N H_2$.
α -Naphthoic acid	$C_{10} H_7 C O O H$.
α -Oxynaphthoic acid	$C_{10} H_6 (O H) \cdot C O O H$.
α -Naphthol	$C_{10} H_7 \cdot O H$.
β -Naphthol	$C_{10} H_7 \cdot O H$.
Betol	$(C_{10} H_7) O O C \cdot C_6 H_4 O H$.
Quinoline	$C_9 H_7 N$.
M. Kairolin	$C_9 H_7 (H_3 \cdot C H_3) N \cdot H_2 S O_4$.
A. Kairolin	$C_9 H_7 (H_3 \cdot C_2 H_5) N \cdot H_2 S O_4$.
M. Kairin	$C_9 H_6 (O H) \cdot (H_3 C H_3) N \cdot H Cl$.

A. Kairin	$C_9H_6(OH) \cdot (H_3 \cdot C_2H_5)N \cdot HCl.$
Thallin.	$C_9H_6(O \cdot CH_3) \cdot (H_4)N.$
Ethyl-thallin. . .	$C_9H_6(O \cdot CH_3) (H_3 \cdot C_2H_5)N.$
Chinazoline . . .	$C_8H_6N_2.$
Orexine	$C_8H_6(HC_6H_5)N_2.$
Pyrrol	$C_4H_4N \cdot H.$
Iodol	$C_4I_4N \cdot H.$

NOTE.—The hydrogens (with or without replacements) in the brackets immediately preceding the nitrogen in the quinoline and chinazoline formulæ, denote the hydrogens added in forming hydro-compounds.

The PRESIDENT said this paper came most opportunely, for pharmacists had been working somewhat in a maze, as it were, with regard to these preparations which were springing up so quickly on all sides. The Conference was much indebted to Mr. Hodgkin for explaining the matter so clearly and concisely, and the paper would furnish material for study for some time to come. If the President of the British Association, Sir Frederick Abel, or Professor Thorpe, who had honoured the Conference with their presence, had any remarks to offer, he was sure they would be very highly esteemed.

Sir F. ABEL said it had afforded him great pleasure to visit the Conference, where he saw many gentlemen whom he was proud to recognise as his colleagues in the paths of science, and he was especially glad to be present on this occasion and observe pharmaceutical chemists following with such interest what appeared to be the intricacies of graphic formulæ, but which after all afforded the best means of grappling with the ever increasing knowledge with regard to the organic branch of chemical science. In the hands of the scientific chemist these formulæ had been of the greatest assistance in explaining the results of his researches to those who desired to follow them, and he was quite sure that to the pharmacist the study of the graphic formulæ of these interesting groups of bodies, which were becoming of such great importance, could not but assist very materially in the knowledge of their constitution, which knowledge led to that further knowledge, which was also daily increasing, of their uses and appliances. He could not venture to discuss the paper, but Mr. Hodgkin had certainly put the whole subject very clearly and concisely in the abstract of it which he had given, and when the paper was pub-

lished *in extenso* it would be well worthy of study, not by pharmaceutical chemists merely, but by all who desired to see a connected history of this most interesting class of remedies, for which they were indebted to some of the most distinguished workers in pure chemical science. It had afforded him the greatest pleasure to attend the Conference, although he could only do so for so short a time.

Mr. A. H. ALLEN said he had listened to the paper with great interest, and must congratulate Mr. Hodgkin on the very thorough manner in which he had covered the ground. Of course Mr. Hodgkin had been handicapped by having so much to say in so short a time, but he had been much struck by the completeness with which he had formulated the whole of these new remedies, each of which seemed to have been at least mentioned. He had hoped that there would be some reference made to the effect of isomerism on the physiological action of these bodies. For instance, there was more than one form of suphonal. Again, Dr. Knorr discovered antipyrin, the scientific name of which was phenyldimethylpyrazolon, and there were two other bodies of similar constitution, it being merely a question of the exact arrangement of the CH_3 atoms in the molecule. But he was not aware of any researches having been published as to the physiological effect of these isomers. He should be glad to learn something on that subject. Again, there were two other hydroxybenzoic acids isomeric with salicylic acid, which were perfectly well known, and were said to be very distinct as to their antiseptic properties; indeed, one was said to be absolutely deficient in this property. If so, it was a very curious fact that the mere position of the carboxyl group in the benzene chain should produce such a difference in its character in this respect. He agreed with the author that it was very important to master the constitution of these bodies, for it was only by attending to these minute differences that any explanation could be afforded of what appeared to be their anomalous effects. Sometimes a new body when prepared gave results which were not satisfactory, but it turned out afterwards that this was due to the presence of an impurity. This had been the case with salicylic acid, and on examination the isomeric hydroxybenzoic acid had been found in the salicylic acid. Similarly the homologous body of creasotic acid had been found in salicylic acid, more frequently some time ago than at present; in the same manner that carbolic acid used to be obtained contaminated with its homologue cresol more frequently than it was now.

He thought the use of these descriptive names should be encouraged. Sometimes, it was true, they were very long and unwieldy; but, if instead of calling a man John Smith, which gave very little idea of his character, a name could be used which would describe him as a tall, light-haired man, blind with the right eye, limping with the left leg, and having a peculiar irascible temperament, besides giving the names and occupations of his parents and the number and dispositions of his children; that was the sort of name which we really had for many chemical substances, the names of which clearly described them. If trivial names were to be adopted, he would rather that they suggested the characters of the body than the method of preparation. For instance, taking antipyrin, the constitution originally attributed to it by the discoverer was that of dimethyloxychinizin, but it was now known to be a phenyldimethylpyrazolon. If the first of these names had been adopted, and it had been described in the Pharmacopœia as a derivative of quinoline, that would have been a great mistake; it was neither made from quinoline, nor was it derived from quinoline. The name now suggested was phenylon, but he would much rather call it antipyrin at once. He would rather stick to the old name than adopt such a one as phenylon.

Dr. THRESH thought a discussion of this paper would take up more time than the Conference could afford for it. On the previous day the President had referred to the subject of fashion in medicine, but these changes of fashion were only to be deprecated when carried to excess, and it was admitted on all hands that the present change was one in the right direction. Chemists were now busily engaged in the formation of multitudes of new bodies such as those Mr. Hodgkin had so ably described, and on the other hand physiologists and therapists were engaged in the much more difficult task of ascertaining the action of some of them. Unfortunately for the public the number of new bodies was legion, whereas those whose physiological action had been carefully ascertained could be counted on one's fingers. It was, however, beginning to be acknowledged that there was a relationship between chemical structure and physiological action, and it was in this direction one must look for some of the most important discoveries of the future, and in this direction must medicine advance on its way to become a science. In his opinion the author of the paper had been a little too dogmatic, and he gathered that Mr. Allen also shared this opinion. He had had an opportunity of glancing at the paper, and though he believed from the

statements of the discoverers and others that the probable formulæ of these bodies were such as Mr. Hodgkin had given, it was quite possible that in a year or two some of them might be regarded from a different point of view. At the present time students were advised to attempt to assimilate so much knowledge in a short time that they were often unable to distinguish between fact and theory, or what was really based on well attested fact. With these words of warning he should like to add that the paper would be of lasting interest to pharmacists and also to chemical and medical students. The arrangement of the series, so far as he could follow it, showing the relationship of one body to another, was excellent, and would enable those who desired to keep themselves abreast of the time to do so with comparative ease.

Mr. FAIRLEY thought one of the most important points in the paper was that which drew attention to the connection between chemical composition and physiological action. That matter was studied sometime ago by Dr. Crum Brown, partly with reference to strychnine and some of the other alkaloids, and showed the change which took place in the physiological action, when their methyl derivatives were employed. This paper was likely to draw attention to this point, and if followed up it would, no doubt, by-and-bye, enable pharmacists to supply the drugs which physicians required for special purposes, as they would learn how to modify the action of drugs in any desired direction.

Mr. SCHACHT said when he saw these graphic formulæ, a question occurred to his mind, which he had more than once asked without ever getting a satisfactory reply, and which he would now repeat. Had any experiments been made with a view to determine whether these complex chemical remedies acted as a whole, or whether their physiological effects depended upon the action of one or more of the groups of atoms which in the graphic figure appear at one of its angles? Such group might easily be conceived to be less closely held in bondage than the other atoms of the molecule, and, becoming detached within the organism, be the real remedial agent. Had any investigations been made in that direction of inquiry?

The PRESIDENT said it was quite clear that chemists differed on this matter, as doctors did on other matters, and perhaps the whole theory might be pulled to pieces in the next two years; but in the meantime the paper would be of the greatest value to pharmacists in helping them to know exactly where they were, and the younger members in particular could not do better than carefully study it.

Mr. HODGKIN, in reply to Mr. Allen, said he had carefully endeavoured all through the paper to avoid all reference either to physiological or pharmaceutical relations, as he wished to avoid contentious matter. These things were not at all settled yet, and he had simply attempted to take the best recognised formulæ that existed for these bodies, and to show the changes which might be supposed to have taken place in their formation. He had nothing to do with their physiological action, but had treated the question entirely from a chemical point of view. As to Dr. Thresh's remark that he had been rather too dogmatic, he thought a sentence at the conclusion of the paper would relieve his mind on that score. He had simply dealt with the subject from a structural point of view. As regarded the physiological action and the question put by Mr. Schacht, he might say that some time ago this question of the relationship of the physiological action to the chemical structure was most fully discussed in Dr. Lauder Brunton's Croonian lectures, which were published in the *Pharmaceutical Journal*, and should be carefully read by all who were interested. Dr. Brunton there dealt with the effects of the introduction of fresh groups in an extremely able manner, and really helped one to understand the subject. To take, for example, the new body, methylphenacetin, it was known that the introduction of a methyl group into acetanilide to form methylacetanilide had increased its remedial properties in certain directions, and so the experiment was made of introducing a methyl group into phenacetin in an analogous position with very happy results.

The following papers were then read :—

ON THE ESTIMATION OF MINERAL OIL OR UNSAAPONIFIABLE MATTER.

By MESSRS. FAIRLEY AND BURRELL.

In this district large quantities of oil and grease are used in the woollen and leather manufactures and other purposes. Much of this oil is recovered and used again for the same or other operations.

It is frequently found that these recovered oils and greases contain large proportions of mineral oil or unsaponifiable or resinous matter, which are not always readily estimated by the processes given in text-books.

The following process, worked out in my laboratory, has been found to succeed in these cases:—

Five grams, equivalent to nearly 80 grains of the oil, are weighed out, saponified with alcoholic potash (about 80 grams KHO in 1000 c.c. of alcohol), evaporated in a basin on the water-bath to pastiness, then dissolved in from 45 to 50 c.c. warm water and treated in a separating funnel with an equal volume of ether, and 2 to 3 c.c. of alcohol, and shaken three to four minutes. On standing the ethereal solution which comes to the surface is decanted and evaporated.

A second treatment with ether is unnecessary, because, as a rule, the results with a single extraction are correct within 0.1 and 0.2 per cent.

The points in this process are—

1. Keeping the aqueous solution of the soap within a volume not exceeding (for 5 grams of oil), 50 c.c.

2. Treating with an equal volume of ether in one operation, at a temperature of near 90° Fahr. Then the ethereal solution of the mineral oil separates, and, in all successful experiments, is very nearly equal to the volume of ether employed.

3. Washing this ethereal solution with warm water in the separator, which can be done very quickly.

4. When the residue, left after evaporation of the ether and drying, has been weighed, it should always be distilled in a small tube retort. If it distils unchanged, without blackening or formation of acrolein, it is free from soap or ordinary fats.

The peculiar bitter after-taste and fluorescence of oils containing mineral oil are also of importance.

The following results were carried out by the above process, and by different operators:—

1.	Mineral Oil	.	.	.	16.40 per cent.	A.
	"	"	.	.	16.24	" B.
2.	"	"	.	.	17.87	" A.
	"	"	.	.	17.60	" B.
3.	"	"	.	.	18.85	" A.
	"	"	.	.	18.69	" B.
4.	"	"	.	.	32.8	" A.
	"	"	.	.	31.4	" B.
5.	"	"	.	.	35.50	" A.
	"	"	.	.	35.36	" B.

ON THE ESTIMATION OF COTTON-SEED OIL IN LARD.

BY MESSRS. FAIRLEY AND COOKE.

For this purpose Bechi's test, when carefully worked, gives useful results, which can be confirmed by the observation of the heat given out in mixing the samples with a definite proportion of sulphuric acid.

Attempts have been made to apply the specific gravity test; and Bockairy, in a recent number of the *Bulletin de la Société Chimique* (3rd series, ii., 310), takes the density of the lard at $50^{\circ}\text{C.} = 122^{\circ}\text{F.}$ He finds that unadulterated lard varies little in density at this temperature, and that there is a sufficient difference between the density of lard and cotton-seed oil to give a means of approximate quantitative estimation.

Bockairy gives the following numbers:—

	Density at 50°C.
Lard, highest	·8915
„ lowest	·889
„ mean	·890
Very rancid Lard	·8895
Oleo-stearine	·8885
Renal Fat of the Ox	·8895
New Cotton-seed Oil	·897
Old Cotton-seed Oil	·896

New Cotton-Seed Oil and Lard.

Cotton-seed Oil.	Lard.	
0	100	·890
10	90	·8915
20	80	·892
30	70	·8925
50	50	·894
75	25	·8953
100	0	·897

Careful experiments, made by my assistant, Mr. A. W. Cooke, fully confirm the utility of the method, and prove that it may give a most valuable confirmatory test.

The following is a list of results:—

EXPERIMENTS WITH LARD.

*Sp. Gr. of Mixtures at 50° C. (Water at 50° C. = 1000).**Lard.*

900·42	}	Mean = 900·38
900·35			

Lard + 10 per cent. Cotton-seed Oil.

901·19	}	Mean = 901·16
901·13			

Lard + 20 per cent. Cotton-seed Oil.

902·15	}	Mean = 902·09
902·03			

Lard + 30 per cent. Cotton-seed Oil.

903·11	}	Mean = 903·02
902·93			

Lard + 50 per cent. Cotton-seed Oil.

905·13	}	Mean = 904·94
904·85			

Lard + 75 per cent. Cotton-seed Oil.

907·33	}	Mean = 907·36
907·39			

Cotton-seed Oil.

908·72	}	Mean = 908·79
908·86			

EXPERIMENTS WITH LARD.

*Sp. Gr. of Mixtures at 50° C. (Water at 15·5° C. = 1000).**Lard.*

891·63	}	Mean = 891·59
891·56			

Lard + 10 per cent. Cotton-seed Oil.

892·39	}	Mean = 892·46
892·53			

Lard + 20 per cent. Cotton-seed Oil.

893·34	}	Mean = 893·28
893·22			

Lard + 30 per cent. Cotton-seed Oil.

894·30	}	Mean = 894·21
894·12			

Lard + 50 per cent. Cotton-seed Oil.

896·29	}	Mean = 896·17
896·06			

Lard + 75 per cent. Cotton-seed Oil.

898·48	}	Mean = 898·50
898·53			

Cotton-seed Oil.

899·87	}	Mean = 899·92
899·98			

NOTE ON ANALYSIS OF BILE.

BY T. FAIRLEY.

The average quantity secreted in a case of biliary fistula during twenty-four hours was about 30 ounces, or deducting $2\frac{1}{2}$ ounces gall bladder fluid, average bile $27\frac{1}{2}$ ounces. Twenty-four hours' bile, corrected for gall-bladder fluid:—

Quantity	968 c.c.
Specific gravity	1·0086

The bile contained in 1000 parts,—

Water	981·76
Total Solids "	18·24
	<hr/>
	1000·00

The solid matter of the bile contained,—

Cholesterin	0·45
Fatty Matter (free)	0·12
Fat Combined (chiefly Sodium Stearate)	0·97
Sodium Glycocholate	7·51
Sulphur equal to Sodium Taurocholate	0·09
Organic substances precipitated by alcohol, chiefly mucus and epithelium	0·85
Chlorides equal to Sodium Chloride	4·95
Carbonates and Phosphates of Sodium, Potassium, Lime, Magnesia, and Iron	2·54
Copper	trace
Silica	trace
Sulphates }	
Urea }	none
Sugar }	

The solid matter of the bile gave on ignition,—

Ash per 1000 parts	8·34
------------------------------	------

The above analysis was confirmed by a further quantitative analysis of the bile taken five days later.

*Analysis of Fluid from the Gall-bladder (collected during
twenty-four hours).*

Quantity	72 c.c.
Specific gravity	1·0095
Reaction	alkaline

The fluid contained in 1000 parts,—

Water	984.64
Total Solids *	15.36

The solid matter contained,—

Organic ; chiefly Mucin, trace of Albumen	6.72
Chlorides equal to Sodium Chloride	5.73
Sodium Carbonate	2.20
Phosphates, Potassium Salts, etc.	0.71

Mr. ALLEN said he had listened with great pleasure to Mr. Fairley's paper on the estimation of mineral oils in fats. It might seem a trivial matter, but it really got over a serious practical difficulty. It was only those who had experience in the separation of ether from soap solution who would appreciate the value of the observation. A great deal of time was often wasted, and in the end the operator had to throw up the analysis, and begin again, through the obstinate refusal of the two liquids to separate, and any little device by which the separation could be effected conveniently and quickly was of considerable value. The difference in the specific gravity of melted lard and cotton-seed oil was well-known to all chemists now, and was constantly used as a means of distinguishing them and approximately estimating the proportions, but the point which Mr. Fairley had brought out was the use of a temperature of 50° C. instead of the ordinary temperatures which had been used, either 100° F., or as was almost universal now, the boiling point of water, 100° C. There was a considerable practical advantage in using 100° C., or 99° C., as boiling water was always available, and it seemed to him there would be considerable difficulty in using such an awkward temperature as 50° C. and keeping the fat at that during the manipulation. Nevertheless, it was exceedingly interesting to see at that temperature the same difference of some seven or eight in the third place occurred in the gravity of the lard and the cotton-seed oil. He did not hear the paper read by Mr. Conroy at Bath, but from the moment of its being published he had used the method there described, of employing the silver test, with great success.

Mr. CONROY said perhaps Mr. Fairley had grounds for considering the specific gravity of lard to be .889, and it would be only

* The solid matter was carefully dried until its weight was constant, and on ignition gave 8.64 parts of ash.

fair if he would tell them what he considered lard to be. Was it the B.P. article, the fat of the abdomen only?—or was it the ordinary lard sold, made from the backs of bacon containing a lot of oil?—or was it the American pressed lard? Because one could hardly expect the specific gravity of those three kinds of lards to be identical. The specific gravity of cotton-seed oil was, he believed, correct; however, that oil was not added to lard by itself, but always together with mutton suet or some other solid fat, and the introduction of such matter entirely upset the test. He did not know that it would be possible to add cotton-seed oil without reducing its solidity.

Mr. CRIPPS agreed with the last speaker, but he understood from Mr. Fairley's figures that the specific gravity was not of much value for estimating cotton-seed oil. He would ask if Mr. Fairley had tried the iodine absorption as a means of estimating fats. He had found it useful in the case of olive oil and had also employed it to a small extent in the case of lard, but should like to know definitely if it would give accurate results in the estimation of cotton-seed oil in that substance.

Mr. HASSELBY said the admixture of cotton-seed oil with mineral oil affected a great number of chemists. They could not all rely on pure pharmacy, and had to deal with threshing machine owners and others who use a great deal of oil. But the difficulty was that they got blown rape and blown cotton-seed oil mixed with it. If analysts would give them a test for detecting this admixture it would be a great boon to chemists throughout the country. It would touch the outer fringe of the calling. He should like to see at future Conferences a lecture given for outsiders, say on Monday night.

Mr. NAYLOR asked if Mr. Fairley had used auric chloride.

Mr. FAIRLEY in reply said the temperature used for taking the specific gravity was adopted by Bockairy to secure complete fluidity in the fatty substances. The sample of lard was made in the town; it was not American lard. He had not made experiments to test the influence of the addition of solid beef suet or simple fats, but no doubt that would modify the result. The iodine absorption of oils no doubt would be useful, but his paper was mainly a study to corroborate or correct Bokairy's paper. He had not used auric chloride.

The Conference then adjourned for luncheon.

On re-assembling, the next paper read was a—

NOTE ON A SAMPLE OF ADULTERATED SAFFRON.

BY WILLIAM KIRKBY, F.L.S.,

Pharmaceutical Chemist.

The appearance of saffron is so distinctive that it is not an easy matter to sophisticate it so as to deceive a person having a moderate acquaintance with it. Hence it is that a great variety of substances have been used for the purpose, and, although it is probable that the different substances thus used have been ultimately detected and described, it is to be feared that large quantities of adulterated saffron are sold in this country.

The substances used for fraudulent admixture are obtained from both the vegetable and mineral kingdoms. Those of vegetable origin may be divided into two classes; namely, those yielded by the saffron crocus (*Crocus sativus*, L.), and those yielded by other plants. The former class comprises the stamens, the corolla tubes,* and an undue quantity of the yellow styles. The structures obtained from other plants include florets of the marigold† (*Calendula officinalis*, L.), florets of the safflower‡ (*Carthamus tinctoria*, L.), young stems and radicles of a dicotyledonous plant,§ small splinters of sandal wood,|| fragments of red poppy petals,¶ petals of pomegranate and *Saponaria*,** and also a species of grass.†† When necessary, these have been dyed by means of red sandal wood, Brazil wood, or dinitrocresylate of sodium.

The inorganic adulterants are likewise very numerous; and, in order to ensure the fulfilment of their purpose, together with them is usually added honey, glycerine, or glucose.

It is evident, therefore, that a large amount of ingenuity is exerted to defraud the buyer of saffron, and notwithstanding the distinctive appearance of the genuine article, this ingenuity

* J. M. Maisch, *Pharm. Journ.* [3], xvi. 663.

† Greenish, *Pharm. Journ.* [3], xi. 379; J. Biel, *Pharm. Journ.* [3], xiii. 879; "The Month," *Pharm. Journ.* [3], xiv. 324; J. M. Maisch, *l.c.*; Flückiger and Hanbury, "Pharmacographia," 2nd. ed., 668.

‡ Flückiger and Hanbury, *l.c.*; C. Bernbeck, "Year-Book of Pharmacy," 1882, 205 [from *Amer. Journ. of Pharm.*]; J. M. Maisch, *l.c.*

§ M. G. Boutet, *Répert de Pharm.*, tome 7me, 468.

|| Niederstadt, *Pharm. Journ.* [3], xvii. 688 [from *Archiv der Pharm.*].

¶ Bernbeck, *l.c.*

** J. M. Maisch, *l.c.*

†† "The Month," *Pharm. Journ.* [3], xx. 504.

appears to be fairly successful. The vegetable sophistications are, fortunately, not difficult of detection.

At the beginning of the year two samples of saffron were sent to me with the request that I would report upon the quality of them. One of them contained, in addition to true saffron, about 2 per cent. of foreign matter, consisting principally of stamens and fragments of the petals of the saffron crocus; besides these there was an excessive quantity of the yellow styles. The other sample proved to be of far inferior quality. It occurred to me that a description of it might prove interesting to the members of the Conference.

The paper in which this second sample of saffron was contained indicated by its greasy appearance that the drug had been dressed with oil. The specimen at first sight appeared clean and satisfactory. On closer examination it was seen to be of a somewhat different colour from good saffron. The cause of this difference was detected in the presence of a large number of fibres totally unlike the stigmas of *Crocus sativus*. They were of a turkey-red colour, flattened and nearly uniform in width; the width varying in different pieces from .5 mm. to .75 mm. ($\frac{1}{50}$ inch to $\frac{3}{80}$ inch). In length they measured from 13 mm. to 42 mm. (.5 inch to 1.6 inch); the greater number, however, were from 23 mm. to 30 mm. (.9 inch to 1.1 inch). They had a much more rigid appearance than the genuine drug, but when taken between the fingers were found to be more flexible than their appearance suggested, this being no doubt due to the oil adhering to them. Some of the fragments exhibited minute swellings, the significance of which we will consider shortly.

In order to calculate the proportion of the adulterant, the fibres were completely separated and weighed, and it was found that they were present to the extent of 41 per cent.

The fibres were then submitted to microscopical examination, with the object of ascertaining, if possible, their origin.

The transverse section, which is irregularly angular (fig. 1), exhibits a central vascular column surrounded by a zone of irregular thin-walled parenchyma, from which four rays of similar tissue proceed to the periphery. In each ray, a little within the epidermis, is developed a solitary vascular bundle. The tissue surrounding these bundles is in connection with a narrow layer which lines the inner side of the epidermis.

The central vascular strand is extended radially in two opposite directions, and is bilaterally constricted. At each of the two

opposite ends, which contain acute angles, is a narrow strand of hard bast fibres. The xylem has narrow spiral vessels (protoxylem) situated at the acute angles, and separated from the hard bast fibres by a small quantity of soft bast tissue. The median portion of the xylem is occupied by pitted vessels; these extend across it in the constricted portion. The immediate line of constriction is marked by one or two rows of compressed thin-walled tissue, the components being vessels in process of formation.

The whole of the xylem is surrounded by the phloem in such a manner as to produce a rhomboidal figure, in the acute angles of which the bast is but feebly developed, but more strongly so in the obtuse angles opposite to the depressions in the xylem. In

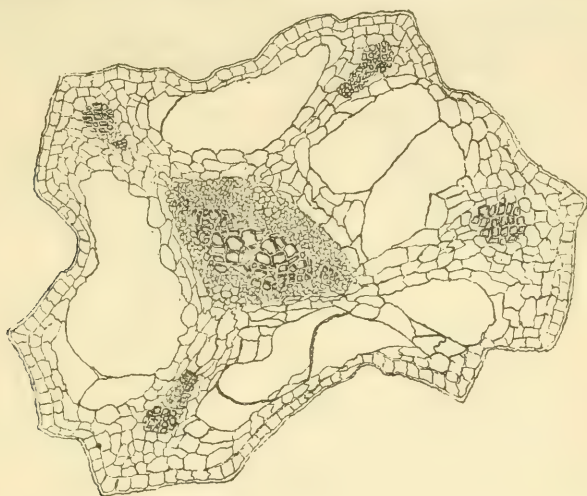


Fig. 1.—Transverse Section of Fibre found in Adulterated Saffron.

these latter portions the lumen of the elements is somewhat increased. In the rows immediately in contact with the wood the cells are of smaller size.

The parenchymatous tissue on the outside of the central vascular bundle is composed of two or three rows of tangentially extended thin-walled cells. The rays proceeding from this are three, four, or five cells wide, the cells being extended radially, except in the broader portions, where they include the cortical bundles; there they are nearly iso-diametrical. The cortical bundles are readily seen by reason of their conspicuous groups of bast fibres. A string of xylem, consisting of two or three narrow

spiral vessels, is usually present on the inner side of these fibres, and is separated from them by a small quantity of soft phloem. With the exception of the parenchymatous rays, the outer portion of the cortex is reduced to one or two rows of loose parenchyma. This arrangement of the tissues results from the presence of four air canals, which alternate with the cellular rays. These canals are generally divided into two or more chambers, either by strings of parenchyma, or by fine threads consisting of cells whose opposite walls are in close contact. The lysigenetic origin of the canals is shown by the presence in them of fragments of cell walls.

The epidermis is composed of a row of prismatic cells having a square cross section. The outer walls of the cells are considerably thickened, as are also, but to a less extent, the inner tangential walls. The radial walls are very thin and undulated.



Fig. 2. —Fragments of Fibres found in Adulterated Saffron.

The anatomical characters are evidently those of a plant belonging to the *Cyperaceæ*, probably a species of *Carex*. The essential peculiarities leading to such a conclusion being the large chambered air canals, and the system of cortical vascular bundles. These latter are leaf-trace bundles which pass through one or more internodes and anastomose with the central bundle at the nodes, as is seen when a section is taken at one of the swellings already mentioned. The swellings are therefore the nodes.

On making a careful search for further evidence, I was successful in finding two fragments bearing leaves, one of them also bearing part of an inflorescence (fig. 2). The vascular system of the leaves is seen under the microscope to be united with the cortical bundles both above and below the point of insertion, as well as with the axial bundle. There seems to be little doubt that the fibres have been obtained from a species of sedge.

A little prior to the time of receiving this adulterated saffron, Mr. E. M. Holmes, F.L.S., sent me some fibres picked out of a sample of saffron. These were found to have the same characters as those described.

That such an admixture is not unknown may be gathered from a remark in M. Boutet's paper ("Falsification du Safran")* to the effect that the fibres he had found were "not, however, the young shoots of *Carex*." Beyond this I have not been able to find any mention of this particular sophistication, although it is not improbable that the grass fragments alluded to by two recent writers may be derived from the same source.

In conclusion, I may point out that this adulterant can be detected by the fibres having a turkey-red colour, a uniform width, and by their rigid appearance. It may be identified by the characteristic transverse section of the fibres.

The PRESIDENT said that purity of saffron was a matter of great importance. It had been always more or less subject to adulteration, and the late Daniel Hanbury had called attention to an adulteration with sulphate of baryta or chalk made adherent by oil or glycerine. The subject of the present paper seemed quite a new form of adulteration, and the Conference was obliged to Mr. Kirkby for calling attention to it. Those who handled saffron largely, and imported it themselves, must look to it that they were not importing saffron plus 40 per cent. of something else.

Mr. LONG asked if any one knew what was the use of saffron as a medicine, and what good was it to retain in the Pharmacopœia such an obsolete article. If it were abolished altogether, there would be no anxiety about its adulteration.

The next paper read was on—

THE SOLVENT ACTION OF ALCOHOL OF DIFFERENT DEGREES OF STRENGTH ON SOME OF THE DRUGS USED IN MAKING PHARMACOPŒIAL TINCTURES.

BY R. WRIGHT,

Pharmaceutical Chemist.

Considering the importance of the tinctures as a class of therapeutic remedies, it is rather remarkable that they have not occupied a more prominent position in the experimental work done by

* *Répert. de Pharm.*, tome 7me, 1879, 468, *vide supra*.

practical pharmacists. It is true that an occasional paper on the subject has been read at meetings similar to this, notably by Mr. W. D. Savage, the late Mr. Stoddart, and others; but so far as I am aware no attempt has hitherto been made to ascertain the comparative value of menstrua containing varying proportions of alcohol, for the extraction of the more important drugs in the *materia medica*. It was in the hope that such an investigation would serve to throw a little light upon the subject that about three years ago a series of experiments was set on foot, the results of which are embodied in this paper.

The original idea was to prepare such of the Pharmacopœial tinctures as lend themselves most readily to such a form of treatment, with alcohol of three or four different degrees of strength, by the same process, and then to estimate the quantity of solid matter taken up by each, by ascertaining the amount of extract left when a given volume was evaporated until the weight of the residue was constant.

In the case of the tinctures representing drugs, the medicinal activity of which is supposed to be due to the presence of one or more alkaloids, it was further proposed to attempt the comparative estimation of the amount of alkaloid in each; and this was done by processes to be described later on in the paper.

The standard tinctures were prepared in the following way:—

The B.P. quantity of the drug ordered for each half-pint of tincture was taken, and where necessary reduced to powder of the requisite degree of fineness. It was then introduced into a well-corked wide-mouthed bottle, into which the spirit had been previously measured, and allowed to macerate for ten days, the bottles being shaken daily. At the end of that time the clear portion of the tincture was poured away, the marc strained and pressed, the expressed tincture added to that which had been poured off, and the whole filtered.

In the preparation of menstrua it was thought to be most convenient to use the B.P. rectified spirit, sp. gr. 838, and containing 84 per cent. absolute alcohol as the basis.

The rule followed in the selection of menstrua was to prepare each rectified spirit tincture with alcohol of the following degrees of strength.—

No. 1 with rectified spirit.

No. 2 with 4 vols. s.v. rect. and 1 vol. water.

No. 3 with 3 vols. s.v. rect. and 1 vol. water.

No. 4 with proof spirit.

In the case of the proof spirit tinctures the rule was to make each tincture with alcohol of the following degrees of strength :—

No. 1 with rectified spirit.

No. 2 with 3 vols. s.v. rect. and 1 vol. water.

No. 3 with proof spirit.

No. 4 with s.v. rect. and water, equal volumes.

In the case of the compound tinctures, *e.g.*, aloes, catechu, gentian, rhubarb and senna, the principal ingredient only was taken, being used in the proportion ordered in the British Pharmacopœia.

Of the seventy-two tinctures contained in the B.P., forty-eight were prepared, the following twenty-four being eliminated :—

Tinctura aurantii recentis.

Tinctura benzoini composita.

Tinctura camphoræ composita.

Tinctura cannabis indicæ.

Tinctura cardamomi composita.

Tinctura chloroformi composita.

Tinctura chloroformi et morphinæ.

Tinctura cinchonæ composita.

Tinctura ergotæ.

Tinctura ferri acetatis.

Tinctura ferri perchloridi.

Tinctura iodi.

Tinctura lavandulæ composita.

Tinctura limonis.

Tinctura lobeliæ ætherea.

Tinctura nucis vomicæ.

Tinctura opii ammoniata.

Tinctura podophylli.

Tinctura quininæ.

Tinctura quininæ ammoniata.

Tinctura tolutani.

Tinctura valerianæ ammoniata.

Tinctura zingiberis fortior.

Tinctura kino.

Another tincture which was subjected to special treatment was *tinctura guaiaci ammoniata*. It is a well-known fact that the menstruum at present official, *viz.*, aromatic spirit of ammonia, is not well adapted for the purpose, on account of the excessive amount of water which it contains. Two samples of this tincture

were prepared, one according to the B.P. formula, the other with an ammoniated menstruum made by mixing 18 fluid ounces of rectified spirit with 2 fluid ounces of strong liquor of ammonia.

Of the tinctures thus prepared, a fluid ounce of the first yielded on evaporation 62 grains of dry extract, whilst the same volume of the second gave 82 grains. With regard to *tinctura cocci* and *tinctura croci*, which are almost exclusively employed as colouring agents, it was thought well to test the colouring powers of each of the tinctures. It was found that cochineal yielded its colouring principle almost equally well to proof spirit, or to a rather stronger or slightly weaker spirit than that. Saffron, however, only yields its most powerful colouring principle to a spirit which is over-proof—a menstruum composed of three volumes of rectified spirit and one volume of water, giving the best results. This yields a tincture having from forty to fifty times the colouring power of the B.P. proof spirit tincture.

The tinctures which are supposed to owe their medicinal properties to the presence of one or more alkaloids are those of aconite, belladonna, cinchona, colchicum, conium, hyoscyamus, opium, stramonium, and veratrum viride.

The general process adopted for the estimation of the alkaloids in these tinctures was as follows:—A fluid ounce of the tincture was introduced into a porcelain dish; twenty drops of dilute sulphuric acid added; and the spirit driven off by the heat of a water-bath. The residual liquid was allowed to cool and then filtered through a plug of cotton wool placed in the neck of a small funnel. The dish and the funnel were then rinsed with a little distilled water, and the whole run into a separating funnel. The colouring matter in the tincture was removed by agitation with two successive 10 c.c. chloroform; the liquid rendered alkaline by the addition of ammonia in slight excess; and the alkaloids taken out by shaking first with 20 c.c. and then with another 10 c.c. chloroform. The chloroformic solutions were drawn off into a tared platinum dish, and evaporated to dryness over a water-bath, the alkaloidal residue being re-heated until it ceased to lose weight.

The above process was applied to all the alkaloidal tinctures except those of cinchona, conium, and opium. For those of conium, a modification of the above was employed, the alkaloids being shaken out with chloroform, and the chloroformic solutions run into a platinum dish containing 20 c.c. of a saturated solution of HCl gas in chloroform. Care must be taken that the end of the funnel tube passes beneath the surface of the acid chloroform, or

loss of alkaloid by volatilization takes place. The chloroform was allowed to evaporate in a current of air; the residue heated at a temperature not exceeding 80° C. until it ceased to lose weight, and the alkaloids weighed and estimated as hydrochlorates.

The alkaloids in the cinchona tinctures were estimated as follows:—A fluid ounce of the sample to be estimated was placed in a porcelain dish; 20 grains of freshly prepared slaked lime added, and the mixture evaporated to dryness. The dry residue was reduced to powder, mixed with a little fine washed sand, placed in an extraction apparatus, and extracted with boiling chloroform, 40 c.c. being used for that purpose. When the process was complete, the chloroformic solution was filtered to separate the particles of lime which had washed through, the filter washed with a little chloroform, the chloroform driven off by evaporation, and the residue weighed.

For the estimation of the opium alkaloids the following process was used:—A fluid ounce of the tincture was evaporated to small bulk, the residual liquid allowed to cool, and then filtered through cotton wool into a separating funnel, the dish and funnel being rinsed with a little distilled water, and the rinsings run into the separating funnel. Ten drops of B.P. liquor ammoniæ was added, and the separated alkaloids shaken out with two successive 40 c.c. of a mixture of equal volumes of chloroform and acetic ether. The alkaloidal solutions were then evaporated to dryness over a water-bath, and the residue heated until it ceased to lose weight.

The general result of these experiments, as exhibited on the tables, is to show that some at least of the menstrua for B.P. tinctures might be modified with advantage. It is quite true that as a rule tinctures made with a strong spirit keep better than those made with a weaker one.

In order to test the effect of keeping upon the stability of tinctures made during the course of these experiments, a sample of each has been kept for a period varying from two to three years.

Of these, the only tinctures made with rectified spirit which show much deposit, are cinchona, cocci, and aloes. On the other hand, tincture of conium and tincture of galls made with proof spirit have deposited to a very considerable extent. Tincture of conium made with proof spirit invariably becomes turbid when kept, but a tincture of the same drug made with mixture of 3 vols. rectified spirit and 1 vol. water will remain clear and free from deposit for an indefinite period. As for tincture of galls,

TABLE I.—*Showing amount of Extract (in grains) yielded by 1 fluid ounce of each Tincture.*

Tincture.	Menstruum employed.		S. V. R. 3 vols., water 1 vol.	Proof Spt.
	S. V. Rect.	S. V. R. 4 vols., water 1 vol.		
Aconiti	4·5	8·0	10·0	10·0
Arnicae	2·5	4·0	4·0	4·0
Asafoetidae	31·0	32·0	29·0	14·5
Capsici	2·5	3·5	3·5	3·0
Cinchonae	19·0	22·0	22·0	23·0
Cinnamomi	7·0	9·0	9·0	6·0
Cubebae	8·0	8·5	8·5	8·5
Laricis	7·5	7·5	8·0	7·5
Myrrhae	19·0	14·5	9·5	<i>nil</i>
Pyrethri	7·0	10·5	10·5	12·0
Sumbul.	13·0	15·0	15·0	15·0
Veratri viridis	5·0	6·5	7·0	7·0
Zingiberis	2·0	3·5	3·5	3·5
	S. V. Rect.	S. V. R. 3 vols., water 1 vol.	Proof Spt.	S. V. R. = water = volumes.
Aloes	10·5	11·5	12·0	12·0
Aurantii	9·0	13·0	14·0	15·0
Belladonnæ	3·0	5·0	6·0	6·0
Buchu	6·0	11·5	11·5	12·5
Calumbæ	3·0	7·0	8·0	8·0
Cantharidis	·5	·5	7·5	1·0
Cascarillæ	6·5	8·0	8·0	8·0
Catechu	45·0	49·0	50·0	50·0
Chiratae	6·0	8·0	8·0	8·0
Cimicifugæ	8·0	12·0	15·0	13·0
Cocci	7·5	15·0	15·0	15·5
Colehiei	9·0	11·0	12·0	10·0
Conii	6·0	6·0	6·5	8·0
Croci	7·0	11·0	11·5	10·5
Digitalis	11·0	17·0	22·0	22·0
Gallæ	44·0	44·0	41·0	40·0
Gelsemii	4·5	7·0	7·0	7·0
Gentianæ	10·5	16·5	17·0	17·0
Hyoscyami	18·0	16·0	20·0	19·0
Jaborandi	12·0	16·0	18·0	20·0
Jalapæ	9·0	14·5	16·0	16·5
Krameria	21·0	20·0	20·5	19·5
Lobelia	7·0	10·5	11·5	14·5
Lupuli	7·0	8·5	9·5	10·0
Opii	16·0	18·0	18·0	18·0
Quassia	—	·5	·5	·5
Rhei	14·5	17·5	18·0	18·5
Sabina	14·0	15·0	14·0	14·0
Scilla	5·5	38·0	42·0	42·0
Senegæ	16·0	18·0	18·5	18·0
Sennæ	7·5	12·5	14·0	15·0
Serpentaria	3·5	4·5	3·5	4·0
Stramonii	2·5	2·5	3·0	3·0
Valeriana	5·0	9·0	9·0	10·0

the three weaker samples have all thrown down copious deposits, that made with rectified spirit alone remaining clear. As rectified spirit exhausts the drug more perfectly than a weaker spirit, it would apparently be advisable to make this tincture with a stronger menstruum than the proof spirit now ordered.

Of tinctures made with rectified spirit which are equally well made with a slightly weaker menstruum are pyrethrum, cinnamon, asafoetida, and sumbul. Of tinctures now directed to be made with proof spirit, which yield an equally good or better product when prepared with a menstruum consisting of equal volumes rectified spirit and water, are quassia, krameria, senna, catechu, digitalis, opium, aloes, cascarilla and senega.

TABLE II.

Showing amount of Alkaloid (in grams) yielded by 1 fluid ounce of each of the Alkaloidal Tinctures.

Tincture.	S. V. Rect.	Menstruum employed.		Proof spirit.	S. V. R. = water volumes
		S. V. R. 4 vols., water 1 vol.	S. V. R. 3 vols., water 1 vol.		
Aconiti	·0185	·0246	·0246	·0244	—
Belladonnæ	·0082	—	·0079	·0068	·0069
Cinchonæ	·1560	·1596	·1588	·1590	—
Colchici	·0036	—	·0030	·0032	·0034
Conii	·0375	—	·0477	·0465	·0471
Hyoseyami	·0059	—	·0053	·0060	·0062
Jaborandi	·0198	—	·0360	·0454	·0516
Opii	·3374	—	·3884	·4068	·4252
Stramonii	·0077	—	·0104	·0091	·0052
Veratri viridis	·0229	·0294	·0311	·0360	—

The PRESIDENT, after moving a vote of thanks to Mr. Wright, said it was only needful to refer to the tables on the wall to show that the work done on this matter had been enormous. The figures there put together represented a vast amount of labour, and this subject was one which it was high time should be dealt with. Pharmacists had been accustomed to work either with rectified spirit or proof spirit; but there was no reason for throwing away alcohol unnecessarily, more especially as it did not tend to cheapen, and the special object was to find a suitable solvent

for the active principle of the drug to be treated. Mr. Wright had been watching this subject for some years, and Mr. Farr had also sent a contribution.

In the absence of the author the following paper was read by Mr. Naylor.

NOTES ON CERTAIN ALKALOIDAL TINCTURES.

By. E. H. FARR.

The experiments described in the following notes were undertaken with a view to discover if the official alcoholic menstrua for certain tinctures were those best suited to extract the medicinal properties from the drugs operated upon. A number of preliminary experiments on various drugs tended to show that in many cases the alcoholic menstruum might with advantage be modified in strength.

The present notes are confined to tinctures of *digitalis* and the alkaloidal tinctures of the *Pharmacopœia*.

In making the tinctures, alcohol of various strengths was employed, and in describing the results the numbers prefixed to the tinctures indicate the number of volumes of absolute alcohol contained in 10 of the menstruum. The drugs in powder were macerated and percolated, the last portions being displaced by more of the menstruum until the desired volume of product was attained, expression being out of the question on such small quantities.

The tinctures when made were examined (i.) as to percentage of alkaloid contained; (ii.) amount of extractive; (iii.) miscibility with water as indicating presence or absence of resinous, oily, or waxy bodies and the like; (iv.) miscibility with alcohol as indicating presence or absence of albuminous or mucilaginous bodies; (and lastly) as to appearance after being kept for a few months.

In the assay of the tinctures it was thought that titration with Mayer's reagent might be the simplest and best method, but a trial of that method showed that in the case of aconite, belladonna, and henbane at least, the results were not reliable as applied to the extract left on evaporation of the spirit when dissolved in acidulated water.

The following results on aconite tinctures will illustrate this:—

					Mayer.
A	yielding	·038	alkaloid	to chloroform	required 2·0 c.c.
B	„	·046	„	„	„ 2·8 c.c.
C	„	·038	„	„	„ 2·9 c.c.
D	„	·036	„	„	„ 2·9 c.c.

To test if the manipulation was at fault, a quantity of ·040 aconitine dissolved in 1 per cent. H_2SO_4 was titrated with Mayer's reagent, and required 1·55 c.c. for complete precipitation (1·55 c.c. Mayer's reagent = ·0417 aconitine). After these indications the use of Mayer's reagent was abandoned, and the alkaloids estimated by weighing.

For the estimation of the tinctures of aconite the following process was adopted, also for belladonna, henbane, and stramonium. A volume of 50 c.c. of tincture was evaporated on a water-bath to expel the spirit, the bulk being kept at about 20 c.c. by adding water. A little dilute H_2SO_4 was then added, and the whole shaken with chloroform to remove colouring matter, etc. Excess of K_2CO_3 was next added, and the alkaline fluid shaken with two successive portions of chloroform, which after being mixed were well washed with water and evaporated.

The tinctures of colchicum, gelsemium, jaborandi, and veratrum were estimated in a similar manner, only in their case ammonia was used to liberate the alkaloid. On account of the excess of mucilage in 5 and 3 of jaborandi, and to a certain extent in 7 also, on shaking with chloroform, or even with chloroform mixed with ether, an almost inseparable jelly was formed and the results were rather uncertain. The plan adopted finally consisted in precipitating the mucilage from the tincture after evaporation to low bulk by the addition of alcohol, and then proceeding as with the others.

Cinchona.—Four tinctures were made 9, 7, 7 with 1 per cent. tartaric acid and 5; 50 c.c. of tincture were acidulated with a little sulphuric acid and evaporated to expel spirit, adding a little water from time to time to keep the bulk above 20 c.c. When the spirit was expelled the residual liquid was treated with excess of caustic soda solution and exhausted with benzolated amylic alcohol. The benzolated solution was washed with water until the washings came away colourless, then shaken with one per cent. sulphuric acid in two successive portions. The acid solution of sulphates was then treated with excess of soda and shaken with chloroform mixed with a small proportion of ether (to facilitate separation). After being washed the chloroformic solution was evaporated in a

tared dish until constant at 100° C. The alkaloidal residues were dark in colour but showed most distinct crystalline structure. The alkaloidal and other results will be found on the following pages in tabulated form.

Conium.—Four tinctures were made with 9, 7, 5 and 3 spirits. For estimation 50 c.c. of tincture were acidulated with 1 c.c. normal H_2SO_4 , and evaporated on water-bath with constant stirring and occasional additions of water until the spirit was expelled. The acid solution was next treated with chloroform to remove colouring matter, etc., then made alkaline with excess of ammonia and shaken with chloroform in two successive portions. The chloroform after being well washed with water, to remove all traces of ammonia, was next well agitated with 3 drops of strong hydrochloric acid and transferred to a tared beaker. It was allowed to evaporate spontaneously, until all chloroform was dissipated, then transferred to bell jar over H_2SO_4 , and weighed each day, until constant for forty-eight hours. The hydrochlorate seems permanent in bell jar over acid, though exposed to the air it rapidly develops the characteristic odour of conia. The resulting salt was almost white, and crystalline, the crystals polarizing.

Digitalis.—For the estimation of these tinctures the following process was employed:—The tincture was evaporated to consistence of soft extract, and this was dissolved in 10 per cent. acetic acid whilst still warm. The resulting solution was shaken with petroleum ether 1 part, ether 2 parts, until these ceased to remove colouring matter and then made alkaline with slight excess of normal soda solution and shaken with chloroform. The chloroform on evaporation left an almost white granular residue, which in the case of No. 7 and proof tinctures had a faint greenish shade. This residue was weighed, then treated with 1.75 phosphoric acid, and the colours compared by dilution in Nessler glasses. This showed that the residues were of similar composition.

Opium.—One set of tinctures was made from powdered opium having an assay of 11.5 per cent. morphia, and another from moist opium containing 10.7 per cent. morphia (as assayed by B.P. method).

In making the latter the opium was rubbed smooth with some water, and macerated two hours with the rest of it before adding the spirit.

The resulting tinctures were assayed by a slight modification of the B.P. process.

	Alkaloid from 50 c.c.	Extrac- tive from 5 c.c.	1 vol. tincture mixed with 2 vols. water.	1 vol. tincture mixed with 3 vols. alcohol.	Appearances of fresh tincture.	Appearance after keeping 4 to 6 months.	Remarks.
Aconite 9 . . . 7 . . . 5	-019	-098	opalescent	bright	bright	bright, no deposit	No. 7 appears to be the best menstruum.
	-023	-144	slightly opal	bright	bright	bright, no deposit	
	-019	-156	bright	cloudy	bright	bright, no deposit	
	-018	-163	bright	cloudy	bright	bright, a little deposit.	
Belladonna 9 . . . 7 . . . 5 . . . 3 . . .	-015	-032	slightly opal	bright	green	bright, sl. deposit.	No. 9 may be a little better though there does not appear a lot of differ- ence, allowing for experimen- tal error.
	-013	-067	slightly opal	opalescent	green	bright, no deposit	
	-013	-072	bright	turbid	brownish yellow	bright, sl. deposit	
	-012	-073	bright	turbid	brownish yellow	bright, copious deposit	
Henbane 7 . . . Proof . . . 3 . . . 2 . . .	-012	-158	turbid	sl. cloudy	green, bright	bright, no deposit	No. 7 appears best, but little difference.
	-010	-166	turbid	turbid	green, bright	bright, sl. deposit	
	-010	-162		turbid	brownish, not bright	thick, with de- posit	
	-006	-177		turbid	pale brownish cloudy	thick, more de- posit	
Stramonium 9 . . . 7 . . . 5 . . . 3 . . .	-012	-029	sl. cloudy	bright	bright pale and flores.	bright, no deposit	No. 7 appears best menstruum ; 9 and 7 were dis- tinctly fluores. 6 months after they were made.
	-014	-029	bright	bright	darkest most fluorescent	bright, no deposit	
	-012	-028	bright	bright	dark fluores.	cloudy and dep.	
	-008	-025	bright	bright	pale, slightly fluorescent	cloudy and dep.	

	Alkaloid from 50 c.c.	Extract 5 c.c.	1 vol. tincture mixed with 2 vols. water.	1 vol. tincture with 3 alcohol.	Appearance of fresh tincture and colour.	Appearance after keeping 4 to 6 months.	Remarks.
Colchicum	9 . . .	·054	sl. cloudy	all remained clear	pale straw, bright	bright, no deposit	What slight difference ex- ists seems in favour of No. 5.
	7 . . .	·085	bright	all remained clear	straw, bright	bright, no deposit	
	5 . . .	·091	"	all remained clear	dark straw, bright	bright, no deposit	
	3 . . .	·101	"	all remained clear	brownish straw, bright	bright, no deposit	
Gelsemium	9 . . .	·040	sl. cloudy	all clear	not fluorescent	bright, sl. deposit	No. 7 seems as good as No. 9.
	7 . . .	·052	"	"	bluish fluores.	bright, sl. deposit	
	5 . . .	·057	opalescent	"	"	bright, sl. deposit	
	3 . . .	·049	bright	"	"	bright, sl. deposit	
Jaborandi	9 . . .	·104	cloudy	bright	dark green	bright	No. 3 would appear to be best men- struum.
	7 . . .	·166	less cloudy	sl. flocc. precipitate	"	"	
Veratrum	5 . . .	·200	opalescent	flocc. precip.	brown red	dep., slightly bright	No. 5 is the best in this case.
	3 . . .	·207	sc. opalescent	dense precip.	pale brown red	"	
	9 . . .	·098	milky	bright	bright	"	
	7 . . .	·147	"	"	"	bright, sl. deposit	
	5 . . .	·154	sl. cloudy	sl. cloudy	"	copious deposit	
	3 . . .	·175	"	"	cloudy		

	Alkaloid etc. 50 c.c.	Extract 5 c.c.	Tincture 1 with water 2.	Tincture 1 with alcohol 3.	Appearance after keeping.	Remarks.
Cinchona	9 . .	.232	turbid	—	bright, with slight deposit	In the case of this particular bark, No. 7 is certainly the best menstruum.
	7 . .	.283	turbid	—	bright, no deposit	
	7 . .	.250	turbid	—	—	
	5 . .	.275	turbid	—	bright, with slight deposit	
Conium	9 . .	.028	cloudy	bright	bright	No. 5 tincture would probably be as active as No. 9 taking account of experimental
	7 . .	.058	opalescent	opalescent	bright	error and volatilization during
	5 . .	.072	bright	slight floccu- lent precip.	nearly bright	evaporation, which would be less with 9 and 7.
	3 . .	.065	bright	flocc. precip.	cloudy but no de- posit	
Digitalin?						
Digitalis	7 . .	.225	opalescent	precipitate	bright, no deposit	No. 7 tincture is best in this instance.
	proof	.237	less so	"	bright, slt. dep.	
	4 . .	.238	faintly so	"	bright, more de- posit	
	2 . .	.213	clear	"	bright, more dep.	
Morphia						
Opium	(proof .	.177	morphia pre-	—	—	—
powder	{ 4 . .	.214	sent in the	—	—	—
A	{ 3 . .	.213	opium which	—	—	—
	{ 2 . .	.198	thus repre- sents .431	—	—	—
Opium			morphia pre-	—	—	—
moist	{ proof .	.184	sent in opium	—	—	—
B	{ 2 . .	.160	which thus re- presents .575	—	—	—

The results showed that in no case was the opium exhausted in making the tincture. The tinctures made with the lower strength menstrua are on the whole richer in alkaloid (morphia), but the difference is not so apparent as it would otherwise be on account of the varying amount of colouring matter which accompanies the morphia. In the case of the lower ones (2 and 3) the morphia is very pale, whilst in proof and 4 it is dark.

The colouring matter in some instances amounts to nearly 10 per cent. of the morphia weight, and this must be taken into account in forming an opinion on the results.

The tincture No. 2, as compared with a proof one, is paler in colour (2: 5 ratio) and contains less resinous matter. It does not possess the peculiar heavy odour of laudanum to such a marked degree, and probably would not produce the nausea following a dose of the latter to such a degree. (This was the case with one person—a laudanum drinker—but might not be so in all cases.)

All weights are taken on alkaloid or extract dried until constant at 100° C.

The PRESIDENT then moved a vote of thanks to the author.

Mr. ABRAHAM remarked that it might be useful to bear in mind during the discussion of the paper that 90 per cent. of alcohol by volume was about equivalent to rectified spirit, and 60 per cent. to proof spirit.

Mr. ALLEN said Mr. Abraham's reminder was very *à propos*. Some pharmacists, he believed, considered proof spirit consisted of equal measures of rectified spirit and water, and practised accordingly; whereas the fact was that proof spirit approximately resulted from the mixture of three measures of water with five of rectified spirit.

Dr. SYMES said this subject was not a new one, but the Conference was much indebted to these gentlemen for bringing forward definite results. Many years ago there was an opinion expressed that there ought to be a greater variety of strength of solvent for the various drugs, and he believed that a menstruum containing three volumes of rectified spirit to one of water would be on the whole far more useful than either rectified or proof spirit. Mr. FARR stated that a menstruum consisting of 30 per cent. of absolute alcohol was the best for jaborandi leaves, but manufacturers found that rectified spirit gave them the best results as regarded the quantity of pilocarpine they were able to

obtain; at least that was the opinion some time ago. As that gentleman had estimated the alkaloids, not merely the extractive, it was rather remarkable that his experiments should be so much at variance with the practical result on the manufacturing scale.

Mr. CRIPPS, referring to the great amount of work these gentlemen had done, said it could scarcely be appreciated even after an examination of the tables. With regard to some proof spirit tinctures, of jalap, for instance, they were apt to consider these owed their activity to resinous substances. The table showed in the case of jalap only 9 per cent. of extractive with rectified spirit, and 16.5 with proof spirit. One would think from that that the proof spirit tincture was the better; but as it was a resin that was the active principle, the rectified spirit tincture would be quite as active, although the solid matter was very much less. The other solid matter would no doubt be of a saccharine nature. This must be borne in mind in all experiments in which the total solids only were given. Messrs. Farr and Wright had both estimated the amount of total alkaloids in certain tinctures, and in some cases this was of great importance. Some drugs, however, contained two or more alkaloids, which might be active or not; for example, *Veratrum viride* contained two alkaloids, veratroidine and jervine, and he believed that their action was antagonistic; so that the amount of total alkaloids would not assist them much, unless they knew the proportion of each. It would be a good thing also if another series of experiments were made dealing with another set of samples altogether, or three or four sets, for he had met with drugs which yielded a similar amount of extractives, although the active principle might be considerably more or less. Again, one aconite or cinchona might yield more to proof spirit than another, but not any more to rectified spirit.

Mr. MARTINDALE said the Conference was much indebted to these gentlemen for these results. They were almost beginning a new pharmacopœia in this direction, and it was quite evident that this work was most valuable. The homœopaths took up the subject from another point of view. They went on the decimal system, using for the mother tincture 1 in 10, and that opened up the question, not only of strength of spirit, but the amount of ingredient which should be used to produce tinctures. Many tinctures he considered much too weak—there was too much alcohol used, making the tinctures too dilute. In America they had gone to the other extreme in preparing fluid extracts, which were first introduced with the intention of introducing a preparation of

which one fluid part should represent one part of the solid. But these extracts would not keep, or represent anything like the amount of drug they were supposed to; they always deposited a considerable quantity, in some cases of the active principles, in others merely resinous or inert matters. Pharmacists ought to use the least solvent which was convenient, so as to produce a fluid preparation which could be used in medicine; one extreme was the dilute tinctures, and the other was the one in one fluid extract. Something intermediate was being attempted by the American Association, who were following his advice and recommending preparations of which two fluid parts should represent one solid part of the drug used. Something of that kind would be valuable in many cases, but they need not all be the same. What was required was a stable and clear liquid,—a *liquor*, in fact, minus woody fibre and inert matter,—which would represent the drug in as little bulk as possible, which could be prepared with the least loss of labour and material, and in the concentration of which not much heat was employed. It should not be overcooked, and it should not be called a tincture, or great confusion would be introduced. He thought these tables would well repay careful study.

Mr. CONROY said the Conference was very much indebted to these gentlemen for the elaborate and extensive work they had done, but it was a subject which could not be discussed without having carefully studied the papers, and unfortunately the tables were constructed on different principles, and defied easy comparison.

Mr. WRIGHT said his three tables showed the results he had obtained. He estimated the amount of extract and also the amount of alkaloid as grams yielded by each fluid ounce.

Mr. CONROY said, as Mr. Cripps had pointed out, one might be easily misled in this matter in the case of resinous drugs, from which the resin would not be extracted by proof spirit, and therefore the preparation would be almost inert.

Mr. GERRARD said the result of these experiments was deeply interesting, and in many respects altogether unexpected. It appeared that colchicum tincture with rectified spirit yielded for each ounce 9 grains; whereas with water and rectified spirit equal volumes yielded only 10 grains. He should never have expected such a result as that, knowing the nature of the colchicum corn.

Mr. WRIGHT said the extract was from the seeds.

Mr. GERRARD said even from the seeds he should not have ex-

pected such a result. The same remark applied to some extent to jalap, and more especially to belladonna, hyoscyamus, and stramonium. It would be found that belladonna with rectified spirit yielded 3 grains, hyoscyamus 18, and stramonium 2.5. Then with water and rectified spirit in equal volumes belladonna only yielded 6 grains, and hyoscyamus 19. One would expect from the amount of gummy albuminous matter, and specially soluble matter present in the henbane leaf, that more than 19 grains would be obtained using such a dilute spirit. He did not question the results for a moment, but they were altogether different to what he should have expected. Stramonium showed 2.5 with rectified spirit, and only 3 when mixed with water. With reference to the preparation of pilocarpine from jaborandi which had been mentioned by Dr. Symes, he might state that manufacturers for some years had always found it necessary to use rectified spirit as a solvent of that alkaloid, and obtained better results than with a mixture of spirit and water. That was chiefly due to the fact not only that rectified spirit yielded an extract rich in pilocarpine, but that the volume of extract was small, so that they had not to deal with such a large amount of inert extractive; still he was surprised to find so much difference as .019 and .015. He knew from experience that proof spirit would take out the active principle of jaborandi quite as well as rectified spirit, although for manufacturing purposes the latter was the better. As had been mentioned by Mr. Cripps, the yield of extractive was not much guide to the therapeutic value of these preparations. He hoped the authors would continue their experiments, for their labours conferred a boon, not only on chemists and druggists, but on hospital and public institutions, who used tinctures to a large extent; the main object was to obtain economy with efficiency.

Mr. MORRIS desired to thank the authors of these papers, which would lead to a great saving both of time and money. In one tincture, myrrh, he noticed the word "*nil*" under the heading "proof spirit." It had been said more than once that tincture of myrrh should be made with proof spirit, as it contained a gum.

Mr. JOHN BARCLAY said Mr. Wright's results for tincture of cinchona were rather low, being only about 0.5 per cent. He had done work on cinchona bark somewhat in the same direction, and had found standard official bark would yield 0.8 to 0.9 per cent. of alkaloid. He was inclined to think this was to some extent due to Mr. Wright's method of assay, for it seemed somewhat dangerous to evaporate a solution of the alkaloid to dryness with slaked lime.

Mr. HASSELBY drew attention to the remarkable agreement between the two papers, and he thought the tendency was too much for chemists to confine themselves to rectified spirit and proof spirit. The time was coming when the Pharmacopœia Committee ought to consider the suitability of certain mixtures and give a little more room, which was required in more ways than one. Methylated spirit was allowed to be used for liniment for external use, and when he had lately dispensed a belladonna liniment with pure spirit, his customer sent back a note telling him the charge was an extortionate one, which he could not afford to pay; that he had had it made up in two respectable places, and had not been charged more than half. He tried to explain the cause of the difference, but without much success. If the Pharmacopœia Committee would sanction the addition of a little acid to proof spirit in the case of belladonna and aconite, as they did in the case of cinchona in a fluid extract, all the valuable constituents might be obtained from the roots, and they need not resort to methylated tinctures at all. He hoped a little more attention would be given to the question of menstrua.

The PRESIDENT said Mr. Ransom had worked a good deal on the exhaustion of belladonna and other roots, and no doubt he would give Mr. Hasselby any information he might require on the subject.

Mr. LINFORD said, according to the table jaborandi apparently gave more alkaloid to weaker spirit than to the stronger, but if the tincture were made with 30 per cent. alcohol, as in the other table, it would be an exceeding brown tincture, and many people would return it.

Mr. MACEWAN said, some years ago, in conjunction with Mr. Gibson, he did some work on calabar bean, and their experience was that a more aqueous menstruum than rectified spirit extracted the alkaloid more efficiently. He would also remind the meeting of Professor Dunstan's experiments with nux vomica, which were entirely in the same direction. The more aqueous the menstruum the more active it was in extracting alkaloids.

The PRESIDENT remarked that the strength of alcohol mentioned in the Pharmacopœia for extracting nux vomica had been altered in consequence of the paper to which Mr. MacEwan referred.

Mr. WRIGHT, in reply, said those who referred to the smaller amount of extract in tinctures made with rectified spirit than in those for which more dilute spirit was used, should bear in mind another fact, that a dilute spirit presented the advantage in the

case of tinctures made from leaves, that it did not take out the chlorophyll, and sometimes in diluting a rectified spirit tincture containing chlorophyll with water, a very awkward and unsightly separation took place. That would apply to jaborandi leaves amongst others. On the general question of the extraction of alkaloids, he would say that they existed usually in combination with some acid, such as malic, and consequently one would expect an aqueous or weak alcoholic menstruum to extract the alkaloid better. He was fully aware of the work Mr. Gerrard had done on the subject of jaborandi, and had read his results very carefully. So far as the total alkaloids were concerned, in the case of proof spirit the yield was twice as much as Mr. Gerrard obtained from the leaves, but in connection with that subject he should say that Mr. Gerrard's experiments had reference to the quantity of pilocarpine and not to the total amount of alkaloid. He agreed with Mr. Cripps's observation as to the importance of repeating the experiments with fresh samples of drugs. It was a very common experience in the case of drugs containing alkaloids to find a drug inferior in other respects which would nevertheless give a greater yield of alkaloid, although one would never think of using it for the preparation of tincture, if judged only by its physical characteristics. In reply to Mr. Morris, who had drawn attention to the word "*nil*" in connection with myrrh, he could only say that he was not bold enough to attempt to make a tincture of myrrh with proof spirit, because they knew very well that the principal constituents were of a resinous nature, therefore he thought it hopeless to expect to get anything like a good result. Mr. Barclay thought his results were too low with reference to the yield of alkaloid by the tinctures of cinchona. He had had a letter on the subject the other day from Mr. Farr, to whom he had sent a copy of his tables, as they had arranged to compare results. Mr. Farr in reply said the only tinctures in which there was any considerable difference between them were conium, colchicum, and cinchona. With respect to conium, he (Mr. Wright) got a greater yield of alkaloid than Mr. Farr, though not greater than Mr. Cripps found the fruits to yield when he made his experiments on the subject some time ago. He was, therefore, justified in thinking that his results with that tincture were correct. With regard to cinchona also, Mr. Farr had made the same remark as Mr. Barclay had just made, viz., that his results had come out considerably higher than Mr. Wright's had done. Six years ago Mr. Braithwaite read a paper on that subject (*Pharm. Journ.* [3], xiv. 445), and stated that he had

found that rectified spirit extracted the alkaloid better than proof spirit, but as far as the quantity of alkaloid was concerned his results came out slightly lower than his own, although Mr. Braithwaite stated that he found the bark from which his samples were made contained rather more than 5 per cent. total alkaloids. It was quite evident, therefore, that further experiment was wanted on that subject. It was a common experience, he believed, with manufacturers, to find that a cinchona bark which contained a large amount of alkaloids did not always yield the best fluid extract. A good specimen of cinchona bark might yield a poor extract. The only other tincture which Mr. Farr found to differ considerably from his own was tincture of colchicum, but there he should not rely very much on the yield of alkaloid, because colchicum was one of those drugs the active principle of which was not definitely settled. With regard to the effect of lime on the alkaloid in cinchona bark, the process he had employed was pretty well known; it was described in Attfield's "Chemistry," and he had tried it side by side with the process of extraction by means of acid, and had always found the yield come out tolerably correct.

The following two papers were then read—

LABORATORY NOTES ON EXTRACTS OF MALT, SEMI-SOLID AND LIQUID.

BY JOHN C. UMNEY,

Pharmaceutical Chemist.

Notwithstanding that extracts of malt are by no means novel, having been used more or less as medicinal and dietetic substances for the past twenty years, still it cannot be said that at the present time the preparations as met with in trade are either uniform or satisfactory. Uniformity may be absent because no preparation has been made official in Great Britain, and it has been the custom of some manufacturers to produce these preparations with wholly unsuitable apparatus and without due regard to the chemical properties of the constituents of malt which make these extracts valuable as a medicinal agent. The extracts were first introduced in a liquid form, and professed to be made from malted barley entirely. They contained an appreciable quantity of alcohol, which was said to be the result of a partial fermenta-

tion, were flavoured agreeably by aromatics, and were possibly consumed as much on account of the alcohol contained in them as for the nutritive extractive of the malt itself.

The public taste, influenced by advertisements in the press, is now evidently in the direction of some semi-solid extract, but such a preparation in my opinion is not so convenient for use, neither does it always reach the public in such an uniform condition, free from change or decomposition, as is desirable.

Suggestions have been made from time to time for perfecting these extracts, the object specially in view being to obtain a product which should contain the maximum percentage of diastase, to which its medicinal value is mainly attributed.

The difficulty of preserving semi-solid extract of malt was first pointed out as far back as 1870 by Ebert, and it continues up to the present, for extracts of high diastasic power that will keep perfectly and remain free from fermentation and acidity, seem to be rare.

Many of the extracts of trade whose keeping properties are noteworthy have been rendered so by the addition of glycerine or salicylic or boracic acids. These latter, when present even in very small proportion, have a destructive action on diastasic ferment. Moreover, this action of mineral and very many organic acids on diastase should not be lost sight of, and due regard paid to the statement of physiologists that the extract should be taken about two hours after a meal, when the acid of the stomach has been almost entirely exhausted in the process of digestion.

A recent examination of trade samples shows the extreme variation in diastasic power of some of the extracts now in trade, the results being shown in the following table :

Sample.	Sp. gr. at 60° F.	Diastasic power. 10 grams of extract will convert 10 grams of starch at 100° F. in
1. English manufacture	1.373	4 minutes.
2. " "	1.403	18 minutes.
3. " "	1.393	not finished in 2 hours.
4. " "	1.392	12 minutes.
5. " "	1.375	not finished in 2 hours.
6. " "	1.375	4 minutes.
7. German "	1.395	35 minutes.
8. " "	1.410	15 minutes.

(According to Jungk, a good malt extract should convert its

own weight of starch into sugar and dextrine in ten minutes at 100° F.).

Objections other than the variability of the semi-solid extracts are chiefly those of viscosity and the extreme difficulty in pouring or using an extract of such a consistence.

Experiments were made to produce a liquid preparation of malt that would contain the full diastasic power of the grain, and at the same time be easy to take, palatable, and elegant in appearance.

I have made the following notes when working on a fairly large scale, using generally a quarter of malt for each operation. Five points in this manufacture deserve special attention.

- (1) Selection of the malt.
- (2) Crushing by suitable machinery.
- (3) Temperature for infusion (mashing).
- (4) Filtration.
- (5) Evaporation.

The palest malt is preferable for the production of the extract, as a light coloured preparation is more elegant and has these two advantages, the one that the yield of extract from pale is greater than from more highly roasted, and consequently deeper coloured malt; the other that a higher temperature may be safely employed for its infusion. This latter is so well known to brewers, that a difference of several degrees in the temperature of the water used for mashing is always allowed between pale and deep coloured malt.

The malt should be crushed but a short time, say a few hours at the most, prior to infusion, otherwise it rapidly absorbs water, becomes heated, and consequently damaged. It has been my custom to use a rapidly rotating mill, consisting of small steel rollers which bruise the malt and produce no appreciable quantity of flour, which is troublesome to deal with after infusion, on account of its proneness to form a magma, which inevitably results if the grain be crushed too finely, and hinders, not only the action of the diastase upon the starch, but also the rapid filtration of the infusion.

The temperature of the water used for the infusion or mashing (as brewers term it) should not exceed, when using fine pale malt, a temperature of 165° F. The quantity of water used may be increased or lessened in proportion to the help that may be given to the digestion and extraction of the malt by a mechanical agitator, and also to the machinery at disposal for removing from

the marc the whole of the saccharine fluid. Prior digestion of the malt in cold water, as recommended by some authorities (United States Pharmacopœia for six hours and the German for three hours), has been tried, but in my hands has not proved of any special advantage; on the contrary, I have come to the conclusion that when once the process is started, the greater the acceleration of the exhaustion, filtration, and evaporation, the better the final product. The water used in the manufactures I have conducted has been that of a London water company. It is well known, however, that distilled water, or even water containing but small proportion of calcium salts gives a product containing less albuminoids than a water charged with lime salts, especially sulphate.

It will be found convenient to continue the mashing with agitation for not less than two hours, every opportunity for subsidence is then given, the supernatant liquor siphoned from the exhausted grain, this latter rapidly transferred to a powerful press and deprived of all moisture possible, the infusion being then filtered through suitable material by the aid of a vacuum, finally boiled in vacuo, the temperature of which need never exceed 125° F.

The filtration is a most important point, and without the aid of a vacuum filter would be next to impossible, and further, unless this part of the process be carried on rapidly, acetification sets in and the value of the product is seriously impaired.

The extract is concentrated until it reaches a specific gravity of about 1.375 at 60° F., when it is withdrawn from the apparatus, transferred to a suitable vessel, and without any delay sufficient spirit of wine, previously diluted with water, gradually added, so that the final product shall contain 7.3 per cent. of alcohol by weight, equal to about 15 per cent. of proof. It is important that the spirit be diluted and added slowly, because it is well known that strong alcohol is a ready precipitant of diastase.

The completed product will have a specific gravity when filtered of 1.250. Filtration of such a viscid fluid as liquid extract of malt is by no means easy, and it is all important that it should be carried on as free as possible from atmospheric influence, if only to prevent thickening of the extract, loss of alcohol, and consequent acetification. Finest selected pale malt will give a filtered product of about 95 per cent. by weight of fluid extract, the yield of semi-solid extract being from 80 to 85 per cent.

A liquid extract prepared according to the foregoing, provided attention be paid to every detail, will give an average indication

of diastasic strength equivalent to a semi-solid extract, converting its own weight of starch in six minutes, bearing a favourable comparison with the best of the extracts referred to in above table.

This liquid extract is elegant in appearance, possessed of maximum diastasic value, and exceedingly palatable.

It is not prone to fermentation, solidification, or any of the changes to which the semi-solid extract is liable, and keeps perfectly at all seasons.

In my opinion the fluid will at no distant date supplant the semi-solid extract.

In the absence of the author, this paper was read by Mr. Naylor.

EXTRACT OF MALT.

By D. B. DOTT, F.R.S.E., F.I.C.

Malt extract is of great value on account of its peculiar nutritive properties and its diastasic power. Increased importance is attached to the latter property, some one even asserting that without diastasic power the extract is worthless—a statement which is certainly beyond the evidence. Yet there is no doubt that the diastasic property is an important one, and ought to be possessed in fair degree by a good malt extract. Hence it becomes of importance to have an accurate means of estimating that power, and it seems desirable to fix a standard for the same. It is scarcely correct to speak of “the estimation of diastase,” as pure diastase has never been prepared, and the gravimetric relation of sugar produced, to pure diastase, is unknown. What we estimate is the effect, that is the amount of starch converted into maltose and dextrin, although, of course, the effect is due to a compound, or mixture of compounds, called diastase. There are two general methods of determining the diastasic value of an extract: 1st, by allowing a given quantity of extract to react with a given quantity of starch-paste, at a certain temperature, noting the time required for the conversion of the starch, as indicated by its ceasing to give a blue colour with iodine; 2nd, by the action of a given amount of extract on excess of starch at a certain temperature in a given time, the amount of sugar produced being then determined. The latter is undoubtedly the more accurate and reliable method, and is that adopted by the best authorities. O’Sullivan uses potato

starch, and determines the amount of alteration with the polariscope; but from a pharmacist's point of view, the process as described by Duggan (*Year-Book*, 1886, 259) is preferable; 5 c.c. of a 5 per cent. solution of the extract is mixed with 250 c.c. of a 3 per cent. solution of arrowroot, at a temperature of 55° C. After digesting for half an hour at that temperature, 5 c.c. of a 10 per cent. solution of soda is added, and the whole diluted to 500 c.c. This is then added to a measured quantity of boiling Fehling's solution, until complete reduction, whence it is easy to calculate the amount of maltose (two-thirds the reducing power of glucose) which is present in the solution. The reducing power of the malt extract solution itself is next determined, and the necessary deduction made from the number first obtained, the net result showing the amount of maltose formed from the starch by diastasic action. I think it is preferable to use 400 c.c. of a 2 per cent. solution of arrowroot, as a 3 per cent. solution is inconveniently thick; and to stop the reaction by adding at least double the above amount of soda. As regards the time during which the action should be allowed to continue, half an hour seems most suitable. There is a slight but inevitable error arising from the fact that the reaction does not commence or stop instantaneously, so that it is not desirable to make the period of digestion too short, as that course would simply multiply the error; on the other hand, there is no advantage in continuing the digestion beyond half an hour. The importance of employing a definite kind of starch is recognised, and has been emphasized in an excellent paper by R. A. Cripps.* There may be difference of opinion as to what the diastasic value of malt extract ought to be, but there will be general agreement that the standard should be fairly high. The tendency of most writers on the subject has been to accept too low a limit. Setting aside the diastastically worthless samples, and leaving out of account exceptionally high results, a good extract of malt may be expected under the above conditions to produce not less than three times its own weight of sugar from starch, calculated on the basis that 10 c.c. of Fehling's solution are equal to .0807 gram of maltose. According to the accepted equation (which I know is near the truth) that 7 parts of maltose represent 10 parts of starch, such an extract would convert $4\frac{1}{4}$ times its weight of starch into maltose and dextrin in half an hour.

* *Pharm. Journ.*, Dec. 21, 1889.

The PRESIDENT having moved a vote of thanks to the authors.

Mr. HASSELBY inquired if cod-liver oil could be incorporated with the fluid extract of malt.

Mr. CRIPPS said Mr. Umney's paper was full of important matter, and he quite endorsed his remark as to the importance of rapidity of work in every portion of the process, on account of the rapid acetification. He did not quite catch the temperature at which Mr. Umney worked in determining the diastasic power, but that which he used was 98° F., when he found good extract of malt could digest its own weight of starch in from ten to twelve minutes. No doubt the method Mr. Dott described was really more like what went on in the human frame after taking a starchy meal.

Mr. GERRARD said he had noticed that Mr. Umney mentioned that infusion took place at a temperature of 165°. Of course there was a lowering of temperature in adding water of that heat to malt, but he should not have thought it would have fallen to any great extent. He used a temperature of 125° for evaporation *in vacuo*, and thought 165° rather high for diastase.

Mr. CONROY said he was about to ask the same question. No doubt Mr. John Umney had depended on the lowering of the temperature by the addition of the malt. He should like to know if he had tried the effect of any other preservative, for 15 per cent. of alcohol was a serious matter, especially as this medicine was given in large doses, so that it was an appreciable amount to give to young children. If glycerine could be used instead of spirit, it would be a great advantage.

Mr. CLAGUE suggested it might be possible to find some volatile oil which would not hinder digestion, and yet be a sufficient preservative. The essential oils did not hinder materially the solution of starch by extracts of malt. Another point deserving attention was that in certain fluid extracts of malt there was a considerable tendency to cause irritation. Some persons felt it more than others, but very frequently a fit of coughing was the result of taking a dose. This was very undesirable, and appeared to him to arise from some irritant matter being used or produced in the manufacture, because it was not found in all cases. He had known people to give up taking the extract of malt until they could procure one free from this quality. Besides this there were many people to whom it was a great comfort to be told that the extract contained no alcohol. A statement had been made that some of the leading extracts of malt had considerable quantities of

alcohol present, and it was desirable that pharmacists should be able to give an alternative preparation to those who had conscientious scruples about it.

Mr. S. M. BURROUGHS said it was a very good thing that the study of malt was in future not to be left entirely in the hands of brewers' chemists, whose experience was used usually entirely for the benefit of brewers. Malt was a very changeable product in the presence of moisture, and it was obvious therefore that the process of manufacture should be expedited as much as possible. He heartily concurred in the desirability of having the extract in a semi-fluid condition. No doubt in many cases the addition of alcohol was desirable, but where that was contra-indicated, or where teetotalers objected to its use, liquidity might be secured by the substitution of glycerine for some of the alcohol. As to the temperature, in some recent experiments the best results had been obtained by mashing at a temperature of 140° instead of 165° . If the malt were heated so much as it usually was for brewers' purposes, the diastase was likely to be destroyed before it reached the hands of the manufacturer of extract of malt. Moreover, it was desirable that it should not only be light in colour, but as there were many germs adherent to the husk, that it should be thoroughly brushed before being milled, and should be mashed as expeditiously as possible after milling. In the semi-solid extracts there should be a large proportion of dextrin, but it was desirable to have as much diastase as could be secured. It was important that the sweet wort should remain long enough in the mash-tub to convert all the starch into dextrin. If he understood the desire of the medical profession in this matter, it was to have a preparation which should first be a powerful aid to digestion; secondly, there should be sufficient dextrin to stimulate the gastric secretion; and thirdly, that there should be a good amount of nutriment. Then came in the consideration of the convenience of handling, which might be secured by the addition of alcohol. He was pleased to see a general feeling in favour of a standard being adopted for the diastase, and also for the nutritive properties of extract of malt. It appeared that some makers on the Continent had a very poor opinion of the extract made in this country, for he had had a sample sent him as being specially suitable for the English market, and on looking at it he should think it was the custom in that part of the Continent to evaporate in an open pan at a rather high temperature.

The PRESIDENT said the brewer nowadays was a very scientific

man; and the first thing he did in the morning was to take the temperature of the outer air, and on that depended very much the temperature to which he would raise the water, but as to 164° , brewers mashed many degrees beyond that. In brewing some of the fine Burton ales they went much higher, but it wholly depended on the state of the malt. If it were of a very pale special character, a very high temperature could be used; but on the other hand, if it were highly roasted it could not, or the whole thing set into a perfect magma in the mash-tub. Physiologists were not quite agreed whether there was any value at all in diastase, simply because it was said that the acid of the stomach destroyed it altogether; others said the preparations of malt were of great value if taken at the proper time, viz., about two hours after a meal, when the acid of the stomach was almost exhausted.

Mr. CRIPPS asked if Mr. Umney found on adding spirit to the aqueous extract there was any precipitate of albuminous matter.

Mr. J. C. UMNEY, in reply, said he did not think it would be difficult to emulsify cod-liver oil with liquid malt extract by the aid of acacia or tragacanth, but it could be done more readily with solid extract if it were desired. As to temperature for the determination of diastasic strength, he employed 100° F. The best samples of malt extract converted their own weight of starch in four minutes. The temperature of the water used—the quantity for a quarter of malt being about 120 gallons—was about 165° , and in getting that on to the malt he found the temperature had fallen about 10° , so that it reached the malt at about 155° . The diastase would stand a temperature of 158° without destruction, and the best proof of its not being destroyed was the fact that he had determined it, and found the extract made at that temperature did convert its own weight of starch in four minutes. He had tried glycerine as a preservative, and found it answer very well both for the liquid and solid extracts. The irritation Mr. Clague referred to might be due to salicylic acid, which he had found in a few extracts. He had always been careful to dilute the spirit before adding it, owing to strong alcohol precipitating diastase well as albuminous matters.

In the absence of the author the next paper was read by Mr. Naylor.

NOTE ON THE COMPARATIVE MEDICINAL VALUES
OF THE THREE OFFICIAL BUCHUS.

BY C. J. S. THOMPSON.

Some doubtless may have noticed, in preparing the infusion of buchu leaves, B. P., from time to time, that the product when made from the *serratifolia* variety often differs slightly both in colour and taste from that prepared from leaves of the other official sources, viz., the *betulina* and *crenulata*. My attention was further directed to this matter by a medical friend noting that in the case of a patient who had been in the habit of taking the infusion made from the broad leaf varieties, on an infusion prepared from the narrow leaf being substituted, the difference in the medicinal action was very marked.

The characteristic appearance of the leaves of buchu are well known. The chemical composition, according to Hanbury and Flückiger, mainly consists of a volatile oil, of peppermint-like odour, which deviates the ray of polarized light considerably to the left. On exposure to cold the oil furnishes Barosma camphor, which forms needle-shaped crystals, having almost the exact odour of peppermint. They found the leaves of the *Barosma betulina* to contain 1.56 per cent. of volatile oil. Spica, on making an investigation of the leaves of the *Barosma crenulata*, as to their therapeutic value, believed the medicinal action to depend on the presence of a volatile oil, and the bitter resin. On extracting the oil, and separating it into its soluble and insoluble portions, from the former by means of hydrochloric acid, he obtained the crystalline camphor. The eleoptine he describes as a colourless oil, boiling at a temperature of 204–206°, and resembling peppermint in odour. The result of analysis seemed to indicate that this compound was an isomeride of borneol, $C_{10}H_{18}O$. On distillation with sodium, it is converted into a phenolic substance, a slightly yellowish oil, sparingly soluble in water, and resembling thymol in taste and colour. On submitting the several varieties of buchu leaves to microscopical examination, it was noticed that the circular cells containing the oil on the under part of the leaf were closer together and much larger in the *crenulata* and *betulina* than in those of the *serratifolia*, the oil glands of the latter being both smaller and fewer in number. Assuming the therapeutic activity mainly to depend on the quantity of the volatile oil and resinous matter the leaves contain, a number of samples from the

official sources were procured, with the object of estimating the average proportion of these principles present in each variety.

The leaves of the *Barosma betulina* were first examined, with the following result. Several samples having been treated with ether were found to yield on an average 4.25 per cent. of resinous matter, of a dark, olive-green colour, aromatic, but bitter to the taste and having the characteristic odour of buchu. It was found to be but slightly soluble in hot water, more so in alcohol, and easily soluble in chloroform. From the same samples I extracted by distillation on an average 1.45 per cent. of volatile oil, which developed after a time the strong peppermint-like odour.

Samples of the *Barosma crenulata*, on being submitted to similar treatment, an average of 3.75 per cent. of resinous matter of similar colour and taste was obtained, and yielded 1.6 per cent. of volatile oil.

The samples of *serratifolia*, treated in like manner, gave an average of 3.45 per cent. of resin, but different in colour and taste to the others, and barely 1 per cent. of volatile oil could be obtained.

On incineration, the leaves of the *betulina* gave an average of 4.5 per cent. of ash, those of the *crenulata* 4.6 per cent., and the *serratifolia* yielded 5.30 per cent.

It has been suggested that the medicinal action in some instances is greatly assisted by the presence of the mucilage which buchu leaves contain in a considerable quantity, and which probably acts by allaying the irritation of the mucous membrane, and assists the volatile oil in chronic inflammation, and other diseases of the genito-urinary organs. This suggestion would seem to be borne out by the fact that the fresh infusion of the leaves is preferred, and regarded as more effective than the tincture, in the treatment of such cases. If the mucilage be precipitated from a freshly prepared infusion of the *serratifolia* leaves, it will be found to contain a less quantity than an infusion made with either of the other official species.

The result of this somewhat rough investigation would seem to indicate that the leaves of the *Barosma serratifolia* are probably inferior, as regards their medicinal value, to those of the *Barosma crenulata* or the *betulina*, and we would do well to employ the latter varieties only in making the official preparations.

The PRESIDENT, having moved a vote of thanks to Mr. Thompson, said they had always been taught that the leaves of the *Barosma*

serratifolia were the strongest, but they now heard they were mistaken, and that those of *betulina* were the more powerful. It only showed the necessity of investigating these matters, and not accepting what they were accustomed to read, which was copied from one text-book into another, oftentimes to their own disadvantage.

Mr. GERRARD said he should have liked to ask the author what was the active principle of buchu.

Mr. MARTINDALE said there was more mucilaginous matter in the leaves of the *serratifolia*, and on that he thought the activity of the drug depended.

The following paper, in the absence of the author, was then read by Mr. Naylor.

NOTE ON SYRUP OF HYPOPHOSPHITE OF IRON.

BY JOHN MACINTYRE.

I have a demand for syrup of hypophosphite of iron, B.P.C. On several occasions I have had it returned to me, with the invariable complaint of its becoming milky in appearance after the lapse of a period varying from a few hours to a day or two. Such instability led me to adopt means by which to prevent it.

In the first instance I tried the addition of hypophosphorous acid, with the following results. Having prepared four 1-oz. bottles of the syrup, I added to No. 1, two drops of the acid; to No. 2, three drops; to No. 3, six drops; to No. 4, twelve drops. All developed the objectionable cloudiness, the only improvement being that it was less, and its appearance somewhat retarded; on the bottles returned to be refilled I noted even a greater deposit, but the more frequent removal of the cork naturally accounted for the additional quantity.

In my second experiment I directed my attention to the solvent effect of citric acid. To each of five 1-oz. bottles I added $\frac{1}{8}$ gr., $\frac{1}{4}$ gr., $\frac{1}{2}$ gr., $\frac{3}{4}$ gr., 1 grain of citric acid, respectively, all of which, with the exception of No. 1 (containing only $\frac{1}{8}$ gr.), have stood for over four months without the slightest cloudy appearance or deposit. This would show that $\frac{1}{4}$ gr. citric acid to the ounce of syrup is sufficient to make it a stable preparation.

A trial of similar quantities of citrate of sodium did not prove

so successful; for, as shown by samples, deposit was only absent in Nos. 4 and 5, while they all developed a yellowish colour.

I would add that of the citric acid preparation, $\frac{1}{4}$ gr. of acid to the ounce of syrup, I have kept a 10-oz. quantity in a twenty-ounce, wide-mouthed bottle for about three months, without depositing, but latterly assuming a yellowish tint, and of which sample is shown, No. 6. This is to be expected from exposure to the air, and can be avoided by keeping in bottles quite full, as in other samples which are colourless.

I am therefore of opinion that a thoroughly stable preparation can be made, and my object in bringing it forward is to elicit the experience of others on the subject.

Mr. LINFORD said this preparation was one he had had a great deal of experience of. There was no difficulty in preventing the cloudy appearance in half a dozen ways. In fact, there was no need to have a cloudy appearance at all if the syrup were made according to the suggestion of Mr. Martindale, from iron wire. It was even better to use ordinary blue tacks, which presented many more points and edges to the action of the acid, and the iron was purer than any wire he could easily obtain, unless he used piano wire. The liquor should be made considerably stronger than the syrup, and put into full bottles with waxed corks, and it would keep very well for six months. It could then be made into syrup in small quantities as required. Also for making Fellows' syrup, it was only necessary to use an excess of hypophosphorous acid, to be neutralized on adding the quinine, etc., avoiding too much sugar, and that would also keep without changing colour, or depositing, for at least three months.

Mr. ABRAHAM said it seemed to him more correct to say that citric acid hid or covered the change than prevented it. Whether covering the change in any way was objectionable was another matter.

The PRESIDENT said he was sure the Conference would thank the author of the paper. There were only two remaining, which would be better read in print than abstracted.

CHEMICAL NOTES ON MANNAS.

BY DAVID HOOPER, F.C.S.,

Government Quinologist.

Mannas are concrete saccharine exudations from plants, occurring naturally on the stems and branches, or after incisions have been made in the bark. These secretions are yielded by plants growing in a dry climate, or if in countries where monsoons prevail, in the intervals of dry weather. They have been found in widely distributed natural orders, but more conspicuously in the following species:—Ash, coloneaster, tamarisk, alhagi or camelthorn, eucalyptus, oak, plantain, willow, cedar, larch, and pine. Of these mannas a large proportion are produced in the East, and if they are not natural productions of this country, most of them are found as articles of commerce in Indian bazaars, where they have the same medicinal reputation as the ash manna in Europe.

Each manna contains a characteristic crystalline sugar, forming the chief feature of its chemical composition, with one or more crystalline or amorphous sugars, a small quantity of mucilage, resin, organic acid, insoluble impurity, and mineral matter. Although two or three are analogous in their constitution, they all vary in their solubility in water, rotatory power, melting point, and in their reducing action upon Fehling's solution.

The official ash manna, the type of these exudations, contains 70 to 80 per cent. of mannite, 16 to 20 per cent. of dextro-glucose, and 10 per cent. of moisture. The principal sugar belongs to the class of hexatomic alcohols, and has the formula $C_6H_{14}O_6$. Mannite dissolves in five parts of cold water, scarcely soluble in cold alcohol, but readily dissolved when hot and deposited when cool. It does not reduce alkaline solutions of copper, and when uncombined exercises no influence on polarized light. Kresnel's test for manna is to 'add one part to one part of hot water, and then boil with ten volumes of alcohol at 95° . The boiling solution is then filtered through wool, and after evaporation of the alcohol there remains pure mannite, which should form 75 per cent. Old manna becomes soft, especially if kept exposed to the air; and this, unlike the fresh drug, undergoes vinous fermentation in contact with yeast. The change is probably due to the absorption of enough oxygen to unite with the excess of hydrogen of the mannite, and convert it into glucose. Mannite is not confined to

the ash, but exists in other drugs, as the barks of canella and pomegranate, and in the roots of dandelion and couch grass.

The manna of *Cotoneaster nummularia*, known in India as "shirkhist," is not always pure, and the sample alluded to in the "Pharmacographia," and that examined by Ludwig, were certainly of distinct origin. Some uncertainty and confusion existed about this when Dr. O'Shaughnessy compiled his "Bengal Dispensatory," as he gives "shirkhist" as the bazaar name for ash manna, and says it is soluble in three times its weight of water. M. Raby has lately (*Union Pharm.*, May, 1889) cleared up the chemistry of this manna after examining an authentic specimen from Persia. It contains 8.3 per cent. of glucose, 4.1 per cent. of cane sugar, or an analogous sucrose, and about 50 per cent. of a new sugar, *chirkhestite*, $C_6H_{11}O_6$, apparently belonging to the mannite group. Chirkhestite melts at 112° , slightly affects polarized light, and dissolves in less than half its weight of cold water. It is thus related to sorbite, which melts a little below 100° and does not affect polarized light.

The author of *Makhzan-el-Adwiya*, speaking of shirkhist, says, "and they say that in the towns of the Subeh of Behar and Patna and Bhagalpur, a substance like shirkhist is obtained from a plant called, in Hindi, *katra*, and they prepare it in this manner. The tree is cut down and fire applied to the roots, which causes a flow of boiling juice which concretes into lumps like white sugar sweetmeats, and this sugar has all the properties of shirkhist, and it is called by the people of those parts *harlálu*." Dr. Watt obtained a specimen of manna from the Central Provinces, which, on being submitted to Dr. Dymock for identification, was forwarded to me for analysis with the remark that it was not improbably the Harlálu manna mentioned in the *Makhzan*. The sample was unfortunately from an unknown botanical source. It was in whitish masses, with a stratified crystalline fracture, sweetish to the taste, and with an odour of ordinary manna. It was soluble in twelve parts of cold water with a slight opacity, and the solution was not affected by iodine or lead acetate. It had a slight right-handed rotation on polarized light, and the reduction it caused in Fehling's solution showed that it contained 5.84 per cent. of glucose. It dissolved in cold sulphuric acid with a red colour, and boiled with hydrochloric acid it afforded a brown solution. Oxidized with nitric acid white crystals of mucic acid were deposited. It began to fuse at 130° and melted at 140° into brown globules. Dissolved in boiling water and the

solution cooled, a crop of hard white crystals separated. These crystals did not reduce Fehling's test, and their solution had no action on polarized light. They melted at not below 160° . The mother liquor was very fermentable, abundantly reducing Fehling, and was dextrorotatory. The white crystals were not efflorescent, and resembled mannite, except that they were not so soluble in water; they required 16 parts for complete solution.

The principal sugars in the above three mannas are of the mannite group, the chirkhestite possessing a melting point below that of mannite, but a greater solubility in water, while the sugar of the harlálu manna melts at about the same temperature, but is less soluble than mannite. Most of the other mannas contain principally sugars belonging to the saccharoses represented by the formula $C_{12}H_{22}O_{11}$.

"The manna of the desert," or taranjabin, is obtained in Kurdistan, Persia, and Afghanistan, from the *Allagi Maurorum*, Desr., and *A. camelorum*, Fisch. This substance, a sample of which was supplied from Persia, was analysed by Villiers in 1877. It was found to contain melezitose, cane sugar, and dextrogyre glucose. The melezitose was identical with that discovered by Berthelot in 1858 in Briançon manna from *Pinus Larix*. Its formula is $C_{12}H_{22}O_{11}, H_2O$. It is dextrorotatory, for the sodium ray 88.51° . On boiling with acid it is converted into glucose. Nitric acid oxidizes it to mucic and oxalic acids. It crystallizes in monoclinic prisms and melts at 140° . Markownikoff (1885) analysing a sample of taranjabin from Turkistan confirmed the results of Villiers. The crystals lost one molecule of water at 100° , they melted at 140° , and the rotatory power was found to be $[\alpha]_D = +88.07$. Alekhine found the crystals of melezitose from Turkistan manna to melt at $147-148^{\circ}$. Specific gravity 1.54 at 17.5 . Solubility 1 in 3. The inversion by dilute acids yields dextrose, which was obtained in the crystalline state.

M. Raby has analysed a sample of manna named *bidenquébine*, and said to be derived from the leaves and young branches of a willow. The manna was found in Persia, and is referred to here on account of the principal sugar resembling the melezitose found in taranjabin. It afforded 12 per cent. of sugar, estimated as glucose, and a considerable quantity of a sugar crystallizing in opaque hard crystals like those of sugar of milk. It melted at 150° to a transparent liquid, and dissolved in 5.5 parts of water at $15^{\circ}C$. It possesses the formula of a saccharose, and differs from melezitose in not being efflorescent and in the greater rotatory power of

the glucose derived from it by inversion. The name proposed for this new sugar is "bidenguebinose" (*Union Pharm.*, May, 1889).

The eucalyptus manna contains a peculiar sugar, melitose, and a shower of this substance having fallen during the last dry weather from a large tree growing in my garden, an opportunity was given for examining it. The manna formed on the topmost branches of the tree at the base of the leaf-stalks, and after exuding in a liquid state, collected into drops, dried in the sun, and became detached when shaken by the wind. It occurred in small masses of the size of a pea, and varying in shape, opaque white in colour, soft but not sticky when collected in the morning before the dew had risen, and hard and brittle when dried by the sun or artificially. Its solubility in water at 20° was 1 in 6; the solution had a weak acid reaction and was not affected by lead acetate. Estimated with standard alkaline copper liquor, it was found to contain only 2.81 per cent. of glucose or allied reducing constituent.

The rotatory power of the powdered manna was right-handed, for the sodium ray the determination was $[\alpha]_D = 93.7^{\circ}$. Heated with nitric acid until chemical action was established, and then set aside to cool, a crop of crystals of mucic acid separated. The melting point was 122° . By gentle evaporation of the manna solution the thin interlacing needles of melitose were obtained. Recent researches by Scheibler confirm the formula for melitose (or raffinose) $C_{18}H_{32}O_{16} + 5H_2O$. Dehydrated it melts at $118-119^{\circ}$. It is very hygroscopic, and in a moist atmosphere gradually absorbs the whole of the water removed by drying. Berthelot has shown that raffinose extracted from cotton-seed cake and molasses is identical with melitose from the manna of the eucalyptus, and states that it is widely diffused in the vegetable kingdom. It is reported that the manufacture of sugar from cotton-seed cake is about to be instituted, the recommendation of the sugar being that it is fifteen times sweeter than cane, and twenty times sweeter than beet-sugar.

Dr. Mason, in "Burmah, its People and Natural Productions," mentions a tree belonging to the myrtle tribe scattered on the Karen mountains, which exuded a manna resembling that of the shops. In some instances it dropped from the branches all round the base of a large tree like rain, and it also gushed out of the trunk like a large mass of gum arabic. The eucalyptus tree referred to above, and which is considered to be *E. viminalis*, gave

no manna from the trunk, but while it was shedding from the upper branches white particles of sugar, a quantity of red astringent kino was exuding from the bark at the lower part of the tree.

The pines and the cedars in the Himalayas have this year been thickly covered with manna, and Dr. G. Watt last February supplied some of the young branches of *Pinus excelsa* coated with a white saccharine exudation matting together the acicular leaves. The manna was whitish, opaque, soft and clammy to the touch before it was dried, odourless and sweet. It was perfectly soluble in a little more than its own weight of water, and the solution gave a slight precipitate with lead acetate, and none whatever with two volumes of rectified spirit. The solution evaporated down to dryness by heat afforded no crystals, and it remained amorphous when kept over sulphuric acid in a bell-jar for four months; crystals began to form however when left in the open air where it could absorb water. The amount of water absorbed before it became constant in weight was 13 per cent., an amount required by a saccharose containing three molecules of water of crystallization. The rotatory power of the manna was right-handed, and it had a certain reducing effect upon Fehling's solution, representing 13.5 per cent. of glucose. It melted at 90° , and became completely anhydrous only at 120° . With nitric acid it yielded no mucic acid, but oxalic acid was detected among the products of oxidation. The action of this pine manna towards polarized light, nitric acid, and Fehling's solution, indicate a relation between it and larch manna and the manna of *Pinus Lambertiana*, but the lower rotatory power distinguishes it from the one and the lower melting point from the other. Pinite, a sugar from the sap of *Pinus Lambertiana*, was discovered by Berthelot. It is described as sweet, very soluble in water, somewhat soluble in dilute spirit, not fermentable, and does not reduce potassio-cupric tartrate even after treatment with sulphuric acid. It is dextrorotatory $[\alpha]_D = +58.6^{\circ}$, and melts at 150° . The rotation of the manna from *Pinus excelsa* is $+45.7^{\circ}$.

The above mannas may be regarded as waste products in the vegetable economy, as they appear to be formed in greater abundance than is required by the plant, and become solidified because of the nature of the sugar they contain and the dryness of the climate. In temperate climates saccharine juices are very abundant in some trees in certain times of the year, and by wounding the branches the diluted solution flows in large quantities from

the wound. The sugar maple affords a good instance of this phenomenon, and the white birch, as shown by Professor Attfield,* is another. Some of the palms at the time of flowering exude a sweet substance, which gradually dries upon exposure to the air or remains as a sticky mass. A peculiar exudation of this kind was sent a short time ago by Dr. Dymock, and had been taken from the wild plantain (*Musa superba*, Roxb.). At the time of flowering this substance appeared, first in a liquid state, but solidifying in a few hours. It was sweet, translucent, and of the consistence of jelly. No crystals were observed in it when examined by a microscope, and it was not altogether soluble in water. It lost 56·2 per cent. of moisture when dried at a low temperature, and the resulting extract had the following proximate composition:—

Fermentable Sugar	82·3
Other soluble bodies	7·3
Cellulose	5·2
Moisture and loss	5·2
	<hr/>
	100·0

The sugar was determined by alkaline cupric tartrate, and its solution was inactive towards polarized light. The cellulose, insoluble in water, was not coloured blue by iodine, and possessed no remarkable histological structure.

The leaves and branches of trees are sometimes covered with a sweet sticky substance produced by insect agency, and which has by some travellers been termed manna, without any examination being made of it. I have recently had the opportunity of seeing some rhododendron leaves covered on their upper surfaces with an exudation of this description. The rhododendrons were growing near Simla, and Dr. Watt had collected the leaves from bushes growing in the open at a distance from other trees, and a species of aphid was found upon them. The exudation was hygroscopic, and after several days set into a solid, confused crystalline mass. The manna, or honey, as it should perhaps be called, was obtained by washing a large number of leaves with a camel's-hair pencil in some water, filtering the solution and evaporating to dryness. This extract contained 30·5 per cent. of glucose or similar reducing sugar, and it had a right-handed rotation on polarized light. The smallness of the material prevented any further experiments being made with this interesting secretion.

Other mannas of insect origin are the *trehala*, the cocoon of an

* "A Note on Sap," *Pharm. Journ.*, [3], xiii., 819.

insect found in Persia, and the *lerp manna* of Australia. The former contains a peculiar sugar named *trehalose*, identical with *mycose*, extracted from ergot of rye, and the latter consists of a dextrogyre amorphous sugar and a modification of starch.

I conclude these notes with a table showing the chief characteristics of most of the well-known vegetable concrete saccharine exudations. The solubility is very variable, ranging from one in one-half to one in twelve of water. It is remarkable that they are all right-handed in polarized light. The melting points extend from 90° to 150°, but the determination of this constant in any one kind of manna would vary in different samples, depending upon the presence of extraneous substances influencing the melting point of the chief sugar. All the samples contain a constituent having a reducing effect upon Fehling's solution.

Manna.	Solubility in Water.	Rotation [α] _D .	M.P.	Gl.	Principal Sugar.
Ash (<i>Fraxinus species</i>)	1 in 5	+44·8°	136°	17·8	Mannite.
Eucalyptus	1 in 6	+93·7°	122°	2·8	Melitose.
Cotoneaster	1 in $\frac{1}{2}$	right	112°	8·3	Shirkhestite.
Willow	1 in 5 $\frac{1}{2}$	right	150°	12·0	Bidenguebinose.
"Harlálu"	1 in 12	+22·8°	140°	5·8	(Not named.)
Pinus excelsa	1 in 1 $\frac{1}{4}$	+45·7°	90°	13·5	A saccharose.
Briançon (<i>P. Larix</i>)	1 in 3	right	140°	—	Melezitose.
Alhagi	1 in 3	right	140°	—	Melezitose.
Oak	—	right	—	—	Dextro-glucose.
Tamarisk	—	right	—	—	Dextrin.
Plantain	—	neutral	—	82·3	Glucose.

ON THE USES OF CURRY LEAVES.

By DR. P. S. MOOTOOSWAMY, F.L.S., TANGORE.

The curry leaf tree (*Murraya Koenigii*, Spreng) belongs to the natural order *Rutaceæ*, and is remarkable for its fragrancy. It is a small tree with pinnate leaves, leaflets alternate, ovate, somewhat serrated, panicles corymbiform, terminal, calyx 5-cleft; petals 5, spreading; berry 1-celled, 1-seeded; flowers small and white, appearing in the hot weather. The tree is well known throughout the plains of Southern India, where it grows in the jungles on the lower and mountainous slopes. It is also cultivated in gardens on account of its leaves, which are very fragrant and much used by natives for seasoning their curries. Some gardeners

make their living by the daily sale of the fresh leaves; and coravars, a class of wandering dealers, bring the dried leaves, with those of *Solanum pubescens*, from the jungles, and take them for sale from place to place. The vernacular names of the tree allude to it as "curry leaf," because of its use as a condiment, and in Sanskrit it is called the "fragrant neem," and under one or other of these names it is known throughout India, Burmah, and Ceylon.

The leaves are the only part of the tree, in this part of the country, employed in native medicine, and their properties are aromatic, stomachic, stimulant, astringent, and tonic. They retain their medicinal properties even in their dried state. The leaves are indispensable in seasoning native curries, broths, and pepper water for their daily consumption. It enters as a principal ingredient in their curry-stuff or condiment taken with the rice. In the absence of fresh leaves, dried leaves are purchased and stocked for the cold season. A seasoning preparation, called *vadagam* in Tamil, is made and kept for daily use in almost every house, except those of Brahmins, who do not use onions in their diet. It consists of onions in large quantity, while the other ingredients form smaller proportions. These are garlic, cumin, fœnugreek, mustard, turmeric, and curry leaves. These are well beaten down in a stone mortar and made into a mass, from this a number of large balls are rolled up and dried in the sun. They are smeared with castor oil every morning as they are exposed, and after a few days will become dry enough to store. Curry leaves are also used for flavouring chutneys.

Persons suffering from dyspepsia and diarrhœa resulting from indigestion, make a broth from the leaves. They are first broiled with ghee, and after the addition of a little tamarind and salt, water is added, and the whole boiled. I have found this decoction check the complaint at once.

A useful preparation for allaying vomiting and purging in children is the following: curry leaves, tamarind, neem, country gooseberry, morinda, of each one ounce, sweet flag and ajwain, of each one drachm, water ten ounces. The dose of this is half an ounce twice a day.

The green leaves, rubbed up to a paste and mixed with buffalo's tyre (butter-milk), have been given with success in adult dysenteric cases. The dried leaves enter into a compound powder largely used as an astringent. The seven articles are as follows, with their botanical, English, and Tamil names.

Botanical Name.	English Name.	Tamil Name.
<i>Murraya Kœnigii.</i>	Curry leaves, dried.	Karuvepillai.
<i>Mangifera Indica.</i>	Mango seeds.	Manga palavirai.
<i>Solanum pubescens.</i>	—	Soonday kavathu.
<i>Trigonelia Fœnugræcum.</i>	Fœnugreek.	Vendayam.
<i>Phyllanthus Emblica.</i>	Country gooseberry.	Nelli-kai.
<i>Feronia elephantum.</i>	Wood apple.	Velampalam.
<i>Carum copticum.</i>	Omum.	Omum.

Equal parts of these drugs are finely powdered separately, and then mixed. The dose for children is 3 to 5 grains in honey, and for adults 15 to 30 grains in buffalo's tyre. This powder is much resorted to by native physicians in the treatment of dyspeptic diarrhœa of children attended with flatulency. It is very singular that native doctors, ignorant as they are of the therapeutic action of medicine, never combine opium or other narcotic preparation in their administration of remedies in diseases of children.

Dr. Roxburgh mentions that the bark and root of the plant under reference are applied externally to cure eruptions and the wounds made by the bites of animals. A decoction of the leaves is used in fever mixtures, mixed with other aromatics and bitters.

A clear, transparent yellow oil is sometimes extracted from the seeds, and is known as simabolee oil.

A chemical examination of the leaves has been made by Mr. J. G. Prebble, and will be found in the *Pharmacographia Indica*, vol. 1., p. 263-265. From the analysis it appears that the leaves yield to distillation a small quantity of volatile oil resembling that obtained from the leaves of *Eyle Marmelos*. Ether extracted $7\frac{1}{2}$ per cent. of resinous matter, and a further quantity was removed by alcohol. The resin was greenish black in colour, amorphous and freely soluble in chloroform, bisulphide of carbon, benzol and amylic alcohol, less soluble in glacial acetic acid and petroleum ether, and almost insoluble in acetic ether. It gave an emerald green coloration with sulphuric acid, and yielded picric acid when oxidized by nitric acid. The aqueous solutions of the ethereal and alcoholic extracts contained an acid principle darkened by iron salts, but not precipitated by gelatine. The bitterness of the leaves is due to a glucoside provisionally named *kœnigin*. The crystals were sparingly soluble in water and alcohol, and the solution was precipitated by tannin, lead acetate, and ferroso-ferric salt, but not by alkaloidal reagents.

GENERAL BUSINESS.

Presentation from the Bell and Hills Fund.

Mr. NAYLOR said he had a very pleasing duty to perform in calling attention to the presence on the table of nine volumes of books provided by the generosity of Mr. Thomas Hyde Hills, which he would ask the President to hand over to the local association in Leeds. He was glad to be able to say that that association was an active body, and had already something more than the nucleus of a library. The executive of the association had made a very wise selection of books, and in addition to those he had mentioned there was a copy each of the "Science Papers," and the "Pharmacographia" by Daniel Hanbury, which were presented by Mr. Thomas Hanbury in memory of his brother.

The PRESIDENT then formally presented the books to the Leeds Association, which he said he felt sure would continue to do good work, and he had no doubt would find these volumes useful, not only for senior members, but also to the students.

Mr. G. WARD said it gave him great pleasure on behalf of the Leeds Chemists' Association to accept the very handsome gift which was left as a legacy of the visit of the Conference to the town. He was sure the books would be highly appreciated by the members, and would form, not to the Committee only, but to all, including the associates, a very pleasing memento of the occasion.

The Unofficial Formulary Committee.

The PRESIDENT next moved that the following gentlemen form the Formulary Committee for the ensuing year: Messrs. Martindale, Naylor, Abraham, Greenish, Groves, Maben, Martin, Reynolds, Symes, Wright, and Ransom.

Mr. SAVAGE seconded the motion. The gentlemen named were so well known and so much esteemed that all would have full confidence in them.

Mr. LINFORD thought the motion ought to include an expression of thanks to the Committee for what had been done during the past year.

The motion was carried unanimously.

Place of Meeting for 1891.

The PRESIDENT said the next business was to decide on the place of meeting for next year. An invitation had been received from

Cardiff, and Mr. Alderman Yorath and other gentlemen were present as a deputation to support it.

Mr. Alderman YORATH said he appeared in company with Mr. Coleman and Mr. Munday to give a cordial invitation to the Conference to the Metropolis of South Wales—of Wales, he might say—a town which had sprung up within the last few years, perhaps faster than any other in the United Kingdom. About thirty years ago its population was about 30,000, but to-day it was nearly 130,000. It had some of the finest docks in the world, and the Barry dock, which was close by, was the finest single dock in the world. There were many other objects of interest in the neighbourhood of Cardiff, which was one of the oldest places in the British Isles; there was Cardiff Castle, and also Caerphilly Castle, and many other places which he was sure they would all like to see. The people of Cardiff and the neighbourhood would give them a hearty welcome, and endeavour to make the visit as pleasant as to any other place they had been to.

Mr. COLEMAN had much pleasure in supporting the invitation. Ten years ago the Conference visited Swansea and had no reason to regret it, and he hoped it would be equally well pleased with Cardiff.

Mr. S. TAYLOR moved that the invitation to Cardiff be cordially accepted.

Mr. RIDDLE seconded the motion. Cardiff was a place of great interest to those in the north, seeing it was a very keen competitor in the coal trade, and they were all anxious to see what sort of a place it was.

The motion was put and carried unanimously.

The PRESIDENT said he had received a telegram from Mr. Gilmour, of Edinburgh, the Chairman of the Executive of the North British Branch of the Society, in the following terms:—"Sorry unable to be present at Conference. In name of chemists of Edinburgh and neighbourhood give you most hearty invitation to meet here in 1892. All in our power will be done to make meeting here a success." In connection with that, he might say that the Committee on Monday evening had discussed, as it had done more than once before, whether the time had not come, after following the British Association for twenty-seven years, for the members of the Conference to choose a place of meeting for themselves (cries of "Hear, hear," and "No, no"). Those expressions showed how desirable it was to have the question considered. The British Medical Association did not follow the British Asso-

ciation, but chose another town. It might seem rather inappropriate to make the suggestion after the very kind and appreciative words the Conference had heard that morning from Sir F. Abel, the President of the British Association, and it was not necessary to decide the question now, but it was desired that some thought should be given to it during the year, and that it should be thoroughly ventilated amongst the members and perhaps in the press. As he had said, it had been discussed by the Executive, which because it could not come to a conclusion as to what would be best for the Conference on the whole, for that was the important point, wished the members to consider the subject. Perhaps an intermediate course might be adopted, of holding the meeting rather earlier, so as to be concluded before the Association met; but at any rate he would ask the members to think the subject over.

ELECTION OF OFFICERS.

The following gentlemen were elected as the officers of the Conference for the ensuing year:—

President.—W. Martindale, F.C.S., London.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., London; A. Kinnimont, F.C.S., Glasgow; J. C. Thresh, M.B., D.Sc., Chelmsford; and J. Munday, Cardiff.

Treasurer.—R. H. Davies, F.I.C., F.C.S., London.

Honorary General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., London, and F. Ransom, F.C.S., Hitchin.

Other Members of the Executive Committee.—A. W. Gerrard, F.C.S., London; Professor Green, M.A., B.Sc., London; W. Kirkby, F.L.S., F.R.M.S., Manchester; D. B. Dott, F.R.S.E., Edinburgh; N. H. Martin, F.L.S., Newcastle-on-Tyne; E. M. Holmes, F.L.S., London; F. W. Branson, F.I.C., F.C.S., Leeds; G. Ward, F.I.C., F.C.S., Leeds; and Alderman Yorath, Cardiff.

Honorary Local Secretary.—Alfred Coleman, Cardiff.

Auditors.—David Anthony, Cardiff, and Edwin Yewdall, Leeds.

VOTES OF THANKS.

Mr. SCHACHT moved—

“That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the Local Committee, and especially to Messrs. Branson, Ward, Taylor, and Bowman, for the very successful manner in which all the arrangements connected with the visit of the Conference to Leeds have been carried out.”

It had fallen to his lot to move a similar resolution on former occasions, and it always gave him great pleasure to do so, but never more so than on the present occasion. He did not forget that the labours of the Committee were not quite concluded, and that this was to some extent an expression of gratitude for favours to come as well as for those which were now matters of history; but they would be all quite satisfied to trust to the guidance of the Committee until the end, and anticipated much pleasure therefrom. He must not omit to say, on behalf of the lady visitors, how much gratified they were by the arrangements which had been made for their comfort and pleasure, the precedent inaugurated last year having been most successfully followed on this occasion.

Mr. KINNIMONT had much pleasure in seconding the motion, though he could hardly add anything to what Mr. Schacht had said. On behalf of his compatriots, of whom he was sorry to see so small a contingent present, he joined in thanking the local committee, and especially Mr. Branson, for the very admirable way in which the arrangements had been carried out. He could only hope that the weather—which was beyond the control of the Committee—would be propitious on the morrow, and then the visit would terminate as pleasantly as had ever been the case.

The motion having been carried unanimously,

Mr. G. WARD, on behalf of the local committee, said he was extremely pleased at the very generous and enthusiastic manner in which the resolution had been proposed and carried. It had been to the committee a labour of love, and all difficulties seemed to have melted away before them. They had had the advantage of receiving the help of Mr. Reynolds, who might almost be termed a patriarchal pharmacist, one of the founders of the Conference, and who knew exactly what was wanted. It was the opinion of every one but Mr. Reynolds himself, that he ought to have been the Chairman of Committee, but he overruled them. The Committee had an indefatigable secretary, however, and if things were worked properly, a good secretary was the committee and the committee was very much the secretary. They had all worked harmoniously to produce a result which he hoped was satisfactory on the whole, though Leeds was a smoky town. One of the secretaries of the Conference, he believed, was going to preserve a sheet of paper which he had carried across the street that morning as a specimen of the amount of carbon which could be washed out of the atmosphere by a shower of rain in a few minutes, and

no doubt it would be an interesting memento. Mr. Branson suggested that he should also take a little water from the river as a sample of fairly good ink. But in spite of these trifling drawbacks, he trusted the visit had not been an unpleasant one.

Mr. BRANSON said he had much pleasure in responding jointly with Mr. Ward and his other colleagues, and wished also to mention the names of Mr. Yewdall and Mr. Worfolk, of Ilkley, who had helped him greatly in arranging for the excursion. The Committee had not found their responsibility an onerous one, and if the meeting had proved a success, they were as much gratified as the visitors. He could only say he hoped the Conference would pay another visit to Leeds, when the pleasure would be renewed.

Mr. S. TAYLOR, Treasurer to the Local Committee, also briefly acknowledged the vote of thanks.

Mr. MASON moved—

“That the best thanks of this meeting be given to the authorities of the Yorkshire College for the reception held at the College, and to the Leeds Literary and Philosophical Society and the Leeds Mechanics’ Institution Literary Society, for the use of their halls during the meeting of the Conference.”

The members of the Conference had received a very genial and courteous reception from Professor Bodington, who showed them all that was to be seen in that very important institution, and he was sure that all would retain a very pleasant remembrance of the visit. They were also much indebted to the officers of the other bodies named in the resolution, without whose assistance all the kindly efforts of the Committee would have been in vain.

Mr. HODGKIN, in seconding the motion, said the place of meeting had been most convenient in every way; and he had been especially gratified at seeing the beautifully arranged laboratories at the Yorkshire College.

The motion was carried unanimously.

Mr. REYNOLDS, on behalf of his colleagues on the Councils of the Yorkshire College and the Philosophical Society, begged to thank the Conference for its appreciation of the help they had been able to give, and he would specially include Principal Bodington and the staff of the Yorkshire College, who most thoroughly accepted the desire to make the reception pleasant and instructive. Many who saw the College for the first time

must have been much impressed with this new factor in the machinery of technical education, which was a matter of great interest to their body. These laboratories were a type of what might be found in eight or ten colleges now spread over the country, which would be able to supply the education which their calling would require when the curriculum became compulsory. He therefore felt the greatest satisfaction at the success of the Yorkshire College, believing that it would be a great help to pharmacy, if not to-day, certainly to-morrow.

Mr. YEWDALL also acknowledged the compliment on behalf of the Mechanics' Institute.

Mr. ATKINS moved—

“That the heartiest thanks of the Conference be accorded to the President for the very able and courteous manner in which he has conducted the business of this meeting.”

Mr. Umney was to his mind a typical President of such a Conference, being not only a man of science but a man of business, and a courteous gentleman, and possessing such qualifications, the Conference had been extremely fortunate in having him as President.

Mr. MARTINDALE had much pleasure in seconding the motion. He had known Mr. Umney nearly thirty years, having been a fellow-student with him and enjoyed his friendship ever since. He felt that he should have the greatest difficulty in following him in the presidential chair, but he should do his best, and hoped to see a very large gathering at Cardiff next year. It was a great advantage to the Conference to be a peregrinating body, as it enabled the members to see more of their native country than many of them would do otherwise.

The motion having been carried by acclamation,

The PRESIDENT said he very much appreciated the compliment paid him, not only by putting him in that exalted position, but in thanking him so warmly for the little he had been able to do. He was much indebted to his colleagues on the Committee for the time and thought they had always been ready to place at his disposal in carrying on the business. He would like also to add his personal thanks to the members of the local committee for the excellent arrangements they had made and for the beautiful building they had provided for the meetings. He had attended the Conference for twenty-five years, and never remembered being

in such a convenient building. He also desired to thank the lady visitors for their presence, which added much to the success of the meeting. It had been a great pleasure to him to meet so many old friends who had been attendants at the Conference all the time he had known it.

EXCURSION.

At 9.45 a.m. on Thursday a special train of saloon carriages started from the Midland Station with a party of about 150 ladies and gentlemen, who, in spite of the threatening aspect of the weather, had ventured to join the excursion to Wharfedale. Passing Kirkstall Abbey and other places of interest on the way, Embsay was reached in about forty minutes, where wagonettes awaited the party. A most enjoyable drive across the rising lands of Embsay Moor afforded fine views of the Penine Range, and of typical moorland scenery. At Barden Towers most of the company left the carriages and walked through Bolton Wood by the banks of the Wharfe to the romantic Strid. Thence the drive was resumed to Bolton Abbey, and an excellent luncheon was provided at the Devonshire Hotel. After luncheon, Mr. C. Umney, who occupied the chair, expressed the thanks of the members to the local Committee for the excellent arrangements which had been made for the Conference during its visit to Leeds. Messrs. Ward and Branson replied on behalf of the local Committee, and expressed the gratification that they felt at the visit of the Conference. Mr. Ward proposed "Success to the British Pharmaceutical Conference," coupling with it the name of Mr. S. R. Atkins. Mr. Atkins, in expressing thanks for the cordial way in which the toast had been received, referred to the advantages of scientific gatherings, and especially commended the final social gathering as a source of enjoyment to the hard-working pharmacist. The company afterwards visited the Abbey, which was founded at Embsay in 1120, and removed to Bolton thirty years later. The vicar received the party, and after an organ recital in a restored part of the Abbey, gave an interesting sketch of its history, and conducted the visitors over the ruins. After being photographed in the precincts of the Abbey, the company drove to the station, whence a special train took them to Ilkley. Afternoon tea was provided in the attractive winter gardens of the

Wells House Hydropathic Establishment, and the extensive grounds were inspected. The company then returned by train to Leeds, which was reached at about 7 p.m.

RECEPTION AND CONVERSAZIONE.

On Monday evening, at the invitation of the local Committee, a Reception by the President and other officers of the Conference was held at the Philosophical Hall (Leeds). This was followed by a *Conversazione*, which included a concert, a lantern exhibition of Wharfedale scenery, and the exhibition of various microscopic objects and scientific apparatus. The musical programme included excellent songs and some clever and amusing recitations. The lantern slides illustrated the route of Thursday's excursion, and were greatly appreciated. About fifty microscopes were arranged in the Museum upstairs, and the objects exhibited covered a large field of natural science. The attendance of visitors was large, and the entertainment was in every respect a complete success.

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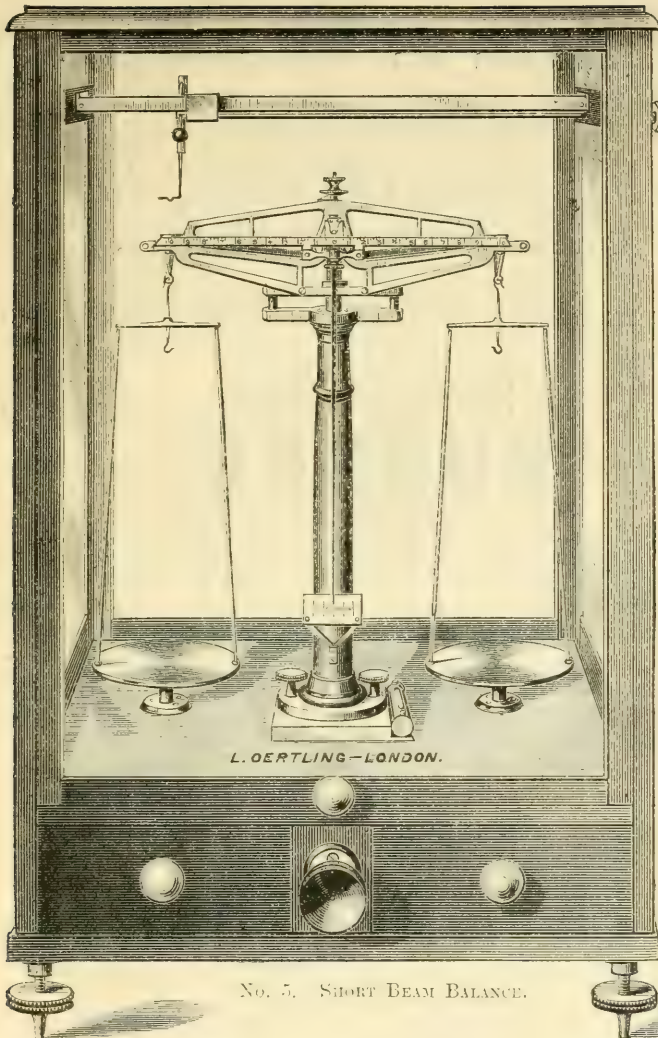
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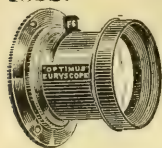
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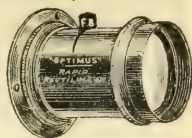
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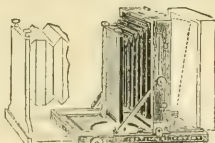
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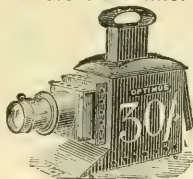
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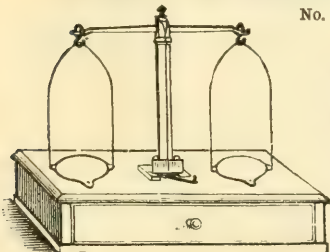
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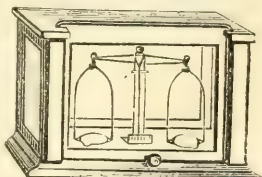
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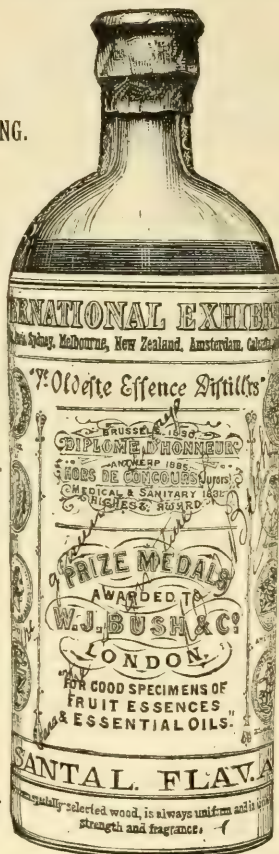
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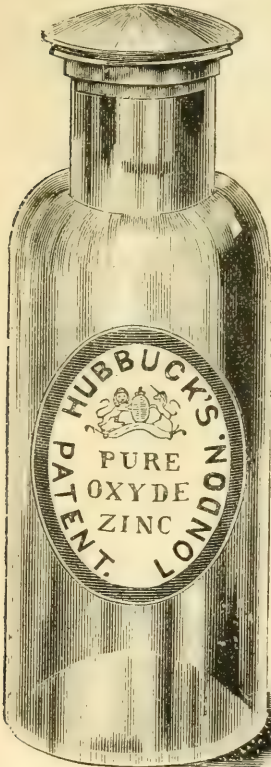
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In Jars (free), $\frac{1}{2}$ lb., 2s. 3d. ; 1 lb., 4s. 3d.

Making respectively 3 lbs. and 6 lbs. of the Emulsion, costing $\frac{1}{2}$ d. per oz., by simply adding water and glycerine.

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Compound Syrup of Hypophosphite of Iron and Lime.

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Syrup of Bromide of Iron.

Syrup of Iodide of Quinine.

Syrup of Iodide of Iron and Quinine.

Syrup of Peracetate of Iron and Quinine.

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Clinical experience has proved that this preparation contains Iron in the most assimilable form.

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The Original Makers of Tasteless Pills, BRIGHTON.

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WHOLESALE DRUGGISTS AND MANUFACTURING CHEMISTS,

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ALSO OF BRITISH WINES; HIGHLY PERFUMED TOILET SOAPS AND
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DRUG GRINDERS.

Finest Non-freezing Cod Liver Oil, "WHITE BEAR BRAND."

ORANGE-QUININE TONIC-WINE.

Price 2s. and 1s. per Bottle.

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In Boxes, 1s. 1½d. and 2s. 9d. each.

"Gell's Foot Rot Ointment,"

For Foot Rot in Sheep, Diseased Thrushes in Horses, and Foul in the Feet of Beasts.

Sold in Tins at 1s., 2s., 5s., and 10s. each.

"SMEDLEY'S CHILLIE PASTE."

Sold in Jars at 1s. 6d. and 2s. 9d. each.

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Sanger & Sons, London. Evans, Sons & Co., Liverpool; Clarke, Bleasdale & Co.,
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MAY BE HAD OF ALL CHEMISTS.

ALFRED WHITE & SONS,

[LATE T. R. & A. WHITE. Established 1775.]

Manufacturers of Acids,—Æthers,—Sp. Æther. Nit.,
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and preparations of Alum,—Animal Charcoal,—Antimony,—Baryta,
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**FOR ALL FLESH INJURIES OR SKIN DISEASES
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BRAGGI'S OINTMENT AND PLAISTER

are daily producing marvellously curative results
BY EXTERNAL TREATMENT ONLY.

THESE REMEDIES are powerfully penetrative, and with a rapidity almost incredible act on the absorbent properties of the flesh, **at once allaying inflammation** and enabling nature to re-assert her healthful sway over injury or disease; the thoroughness of the healing process being evidenced by the absence of all scars or other disfigurements.

BRAGGI'S OINTMENT (or **PLAISTER**, where more convenient to use) is especially suitable for the following accidents or ailments:—*Acne, Abscesses, Blisters, Burns, Bruises, Bad Legs, Boils, Bad Breasts, Blows, Bunions, Chilblains, Cuts, Chapped Hands, Cracked Lips, Corns, Carbuncles, Eczema, Eruptions, Erysipelas, Fistula, Housemaid's Knee, Itch, Insect Bites, Leprosy, Lumbago, Muscular Pains, Neuralgia, Piles, Pimples, Poisoned Wounds, Rheumatism, Rheumatic Gout, Ringworm, Rash, Scalds, Stings, Sciatica, Scrofula, Sprains, Sore Eyes, Swellings, Scurvy, Shingles, Tumours, Ulcers, and Varicose Veins.*

Hosts of Testimonials from all Classes.

BRAGGI'S OINTMENT and PLAISTER should be in every Household and Nursery, and are indispensable to **Travellers, Tourists, Emigrants, Explorers, Soldiers, Sailors, &c., &c.** They contain no animal fat, and will keep good in all climates—a veritable “friend in need” in all parts of the world.

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PRIZE MEDAL AWARDED TO

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PACKED IN TINS, 1, 4, 10, 14, 28, 56 AND 112 LBS.

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Universally adopted by the Medical Profession for
OPHTHALMIA, SCURVY, RINGWORM,
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EXTERNAL AND INTERNAL IRRITATION
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*Packed in Cases—One doz. 1s. 6d. Bottles; one doz. 2s. 6d.
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TESTIMONIALS MAY BE HAD UPON APPLICATION.

"EDIBLE SALVO PETROLIA," FOR PUBLIC SPEAKERS, ACTORS, & SINGERS. 1s. 6d. per Tube.

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Dealkalised—Antiseptic—Superfatted.

The Mildest and Most Healthful Toilet and Skin Soap.

Prescribed by eminent Skin Specialists and by a large number of Medical Men for its Antiseptic, Soothing and Healing effects in Eczema, Psoriasis, and Skin irritation.
 The *Lancet* says:—"It is a perfectly neutral and well made soap, etc."
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Samples and Medical Testimonials free to Chemists on application to the
Manufacturers:—F. JAMES & CO., 61, MARK LANE, LONDON, E.C.

DR. C. R. COFFIN'S AMERICAN DENTIFRICE.

Prepared only by WILLIAM DARLING, Chemist, Manchester.

May be had from S. MAW, SON & THOMPSON; BARCLAY & SONS;
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Price 2s. per box, and family jars, 10s. each

Shop Bottles and Jars

WITH VITRIFIED (burnt in) LABELS.

(Black Letters on a ground of Pink or White Enamel.)

Labels indestructible and of elegant appearance, forming an even surface with the glass or porcelain. The Jars of best porcelain, thoroughly greaseproof. The Bottles hand-made and of superior quality. Both are unsurpassed by anything in the market in every respect. Also a CHEAPER sort of Bottles and Jars, with Labels equally indestructible, but very plain, especially suitable for Dispensaries, etc. Intending Buyers are requested to inspect samples at

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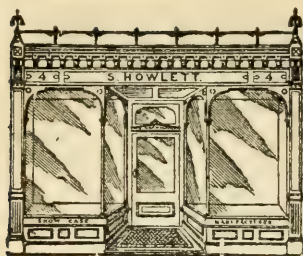
POISON BOTTLES of Ribbed Blue Glass, with RAISED White Vitrified Letters, and the word "POISON" in Red at foot.

DRAWER LABELS of Crystal Glass, with Bevelled edges and Vitrified Labels to match the above Bottles and Jars.



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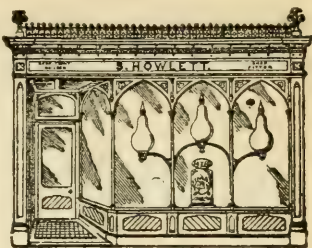
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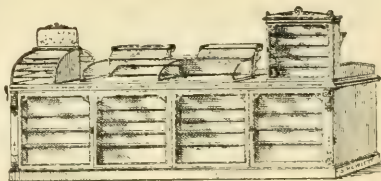


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SHOP-FRONT BUILDER AND SHOW-CASE MAKER.

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MANUFACTORY AND SHOWROOMS:

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improved princi-
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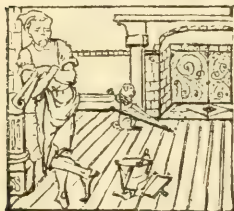
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Medical Glass, Earthenware, Utensils, Etc.

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Chemists waited upon in any
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Labour well planned is half done.

A willing mind makes light employment.

A. S. LLOYD'S EUXESIS,

FOR SHAVING WITHOUT SOAP, WATER,
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CAUTION.

The labels on genuine EUXESIS bear signature of Inventor, A. S. LLOYD, in BLACK INK, and the signature of his Widow, AIMEE LLOYD, in RED INK. Refuse all others.

Manufacturer: AIMEE LLOYD

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"LLOYD'S EUXESIS (WIDOW'S)."*

6/- per Gross.

**1d. PURE
MENTHOL
CONES**



6/- per Gross.

ASSORTED BOTTLE AND VASE SHAPES.

On $\frac{1}{2}$ -Gross Show Cards. Sample Free.

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JEWSBURY & BROWN'S

ORIGINAL AND CELEBRATED

Oriental

Has been used in the highest circles over sixty years, for cleansing, beautifying, and preserving the teeth and gums to old age.



Tooth

White and
Sound Teeth
Insured.

Paste

The ORIENTAL TOOTH PASTE is distinguished by its extraordinary efficacy in removing tartar, insuring to the teeth the most beautiful and pearly whiteness, and inducing a healthy action of the gums. It gives peculiar fragrance to the breath, and will preserve the teeth and gums to old age. Pots, 1s. 6d., or double size, 2s. 6d. Keeps perfect in all climates.

CAUTION.—Observe the name and address on the Pots, also the Trade Mark (J. & B. in a double Triangle). Without these none are genuine.

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And of all Chemists and Wholesale Houses.

CHAMOIS FOR MIRRORS, SILVERWARE, DOMESTIC, UNDERWEAR, AND TOILET USE.

WHITE SPLITS PURE WHITE, SPLENDID QUALITY, FOR CAPPING PERFUMERY, ETC.

WHITE PLASTER SKINS FOR CHEMISTS AND DRUGGISTS.

Basils, White Norway Doeskins, White Mock Does, Buckskins.

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MANUFACTURERS OF

CHEMICALLY PURE TINFOIL, ALL TIN.
Untarnishable in any Climate.

VEGETABLE PARCHMENT.
For Tying Over and Capping.

THIN BAUDRUCHE-SKINS, for Capping.

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BRECKNELL'S SKIN SOAP.

A PURE AND UNSCENTED SOAP, RECOMMENDED BY EMINENT MEDICAL MEN.
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Two Gold Medals R.L.E., Edinburgh, 1890. Highest Awards for Superior Quality.

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GOLD MEDAL,
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**E. H. THIELLAY'S
RENOWNED HAIR DYES,
AND OTHER HYGIENIC SPECIALITIES.**

**EAU FONTAINE DE JOUVENCE, GOLDEN;
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ALSO E. F. JOUVENCE IN EVERY SHADE.

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COMPANION to the E. F. JOUVENCE.

A Delicious Oleo-Fragrance, to fix the tint after operation. 2s. 6d., 4s., 5s., etc.

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TRADE TERMS HALF THE RETAIL PRICE.—Labels, Wrappers, etc., printed with Vendor's name and Address, through the Wholesale Houses, &c. from the Manufacturer—

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Parfumeur-Chimiste,
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(SHOW ROOMS AT CHARING CROSS HOTEL, W.C.)

Agents calling upon Chemists, Perfumers, Hairdressers, etc., can easily add to their income without interference with present occupation. Write to Mr. THIELLAY.

Shippers and Merchants supplied on the usual terms, and at a considerable reduction for Export in Bond.

THE LONDON BRUSH WORKS, AXMINSTER, ENGLAND.

COATE & CO.,

In publishing a new edition of their Illustrated Price Current, tender their best thanks for the favours received for a period of forty-one years.

During which time, by the patterns registered and processes patented, namely, the White Enamelled Cement, the Machinery applied, the New Machines invented, etc., they believe they have taken the lead in improving the Manufacture of Tooth Brushes more than all the other Tooth Brush Makers in the world put together, whose main efforts seem to have been that of trying to imitate the style and patterns of Coate & Co., but with very imperfect success as yet.

For, as a true test of the superiority of their manufacture, Coate & Co. can say that at the present moment their customers are now supplying many of the crowned heads, princes, nobles, and rulers of Europe, Asia, Africa, and America, with Tooth Brushes made by Coate & Co.

Such being our present position in this Branch of Manufacture, we beg to assure our friends and customers that no effort will be spared to hold our position and merit their continued support and approval.

We beg especially to call the attention of our customers to several new patterns of Tooth Brushes now appearing in the new edition of our catalogue, as patterns never yet made by any other manufacturer, and some of which, we think, will command a good sale. We would also note that our Anticurious patterns, namely, A, B, C, D, which were registered by us for the 1851 Exhibition, now 33 years ago, are still popular patterns, and sell well, being most effective in cleansing between the teeth without irritating the edges of the gums.

We hope and think that the life-size Illustrations now issued, will greatly assist our customers at the retail counter, and facilitate orders per letter at home and abroad.

The drawings of each pattern signify actual size and shape, not hardness, except the patterns G H (Goat Hair), V S (Very Soft), V H (Very Hard), Y, for Yellow or Unbleached Hair, B H (Badger Hair), and C B H (Common Badger Hair). All the other patterns are made and sent out in Soft, Medium, and Hard, assorted, unless ordered to the contrary.

If best Tooth Brushes are ordered by the gross assorted, with a remark as to hardness, preferable or objectionable patterns, a better and more saleable variety can be had than if ordered by one or two dozen per No. Observe, no Sponge Brushes, Palate Brushes, Very Soft or Very Hard, would be sent unless specially ordered to be sent in such gross, and customers who order Assorted Patterns can rely on having a nice assortment sent at once; but, when ordered to pattern, more time may be required, for although Coate & Co. held in stock on January 1st, 1859, nearly four thousand gross of Tooth, Hair, and Nail Brushes, made and partly made, yet the variety of Patterns, Qualities, and degrees of Hardness are so great that they cannot at all times keep up a large quantity of each Sort, Pattern or Hardness.

THE FOLLOWING ARE A FEW OF THE PRICES OF OUR MERCHANTABLE TOOTH BRUSHES:—

	Per doz.		Per doz.
C Cemented	2/-	Warranted Best, stamped with Royal	
Cemented	2/6	Arms	5/6
Cemented London	3/-	Warranted Best Hair, stamped with	
Cemented Improved	3/6	Trade Mark	6/-
Cemented Warranted	4/-	Extra Best, stamped with Trade Mark	
Cemented Warranted Extra	4/6	and "Coate & Co., London"	6/6
Cemented, Superfine, stamped with		5 Rows	4/-; 6/-
Elephant	5/-	5 Rows, extra best and to pattern	8/-

All the above qualities are sent out assorted in patterns and hardness, except the extra best, which only can be sent to pattern.

*N.B.—A Large Stock of Finished TOOTH BRUSHES, HAIR
BRUSHES, etc., kept ready for Merchants' Shipping Orders.*

ILLUSTRATED PRICE LIST SENT FREE ON
APPLICATION WITH BUSINESS CARD.

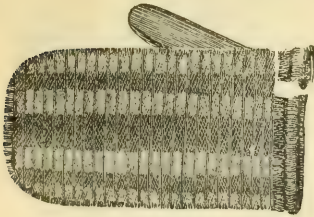
DINNEFORD & CO.,

MANUFACTURERS OF

Horse-Hair Friction Gloves, Belts, Bath Brushes, Oxford and Cambridge Pads, etc., etc.

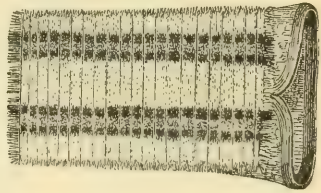
In white, grey, and black hair, of various degrees of hardness, to suit the most delicate, without risk of injury to the skin.

WHOLESALE PRICE LIST.



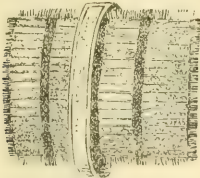
LADY'S AND GENT'S FLESH GLOVE (in Pairs).

No. 1 size, 36s.; No. 2, 40s.; No. 3, 42s.
per doz. pairs. Retail, 5s. each.



PRINCE OF WALES BATH GLOVE.

For wet or dry use. 21s. per doz. Retail, 2s. 6d. each.



CLARENDON FLESH RUBBER.

Hair on both sides. One surface is soft, the other hard; either may be used for friction.
24s. per doz. Retail, 2s. 6d. each.



ARMY BATH PAD.

For wet or dry use. Hair on both sides.
A luxury for the Bath. 12s. per doz.
Retail, 2s. each.

OXFORD WASHING PAD.

For cleaning and softening the hands, and for the bath. In 1 doz. boxes; 8s. per doz.
Retail, 1s. each.

ALEXANDRA BATH BRUSH.

Hair on both sides, on a long handle. 24s. per doz. Retail, 2s. 6d. each.

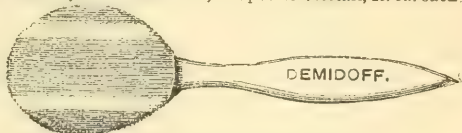


CAMBRIDGE PAD.

Hair on both sides; for softening the hands, and for the Bath, 12s. per doz. Retail, 1s. 6d. each.

THE DEMIDOFF.

42s. per doz. Retail, 5s. each.



FLESH STRAP OR BELT, AND BATH STRAP.

LADIES' quality, light hair and soft pile. GENT'S quality, black or grey, and pile of various degrees of hardness. 42s. per doz. Retail, 5s. each.

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WERNER & PFLEIDERER'S Chemists' Machinery. PILL MASS MIXERS & KNEADERS.

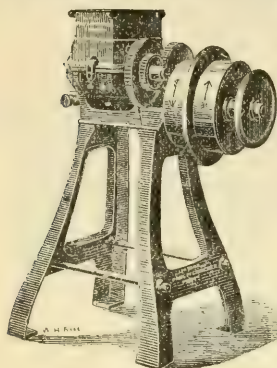


FIG. 97.
Machine in working position.

THE "Universal."

As used by all the large Pill Manufacturers and hundreds of Chemists. This Machine is made in many sizes, the smallest being capable of working up $\frac{1}{2}$ -lb. of mass. Fig. 97 shows size 6, type II., for power; capacity, 6 to 10 lbs. Fig. 130 show size 4, type II., for hand; capacity, 2 to 4 lbs.

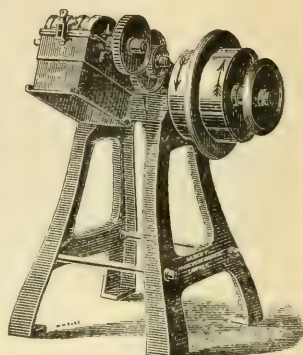


FIG. 98.
Machine tilted for discharge.

"SPIRAL BRUSH" SIFTING MACHINES.

Pill Cutting Machines and
Piping Presses,

TINCTURE PRESSES,

And every Requisite for the Pill-room.

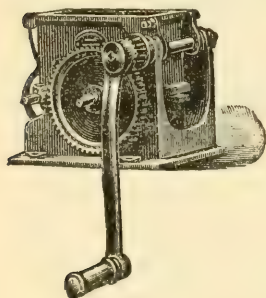


FIG. 130.
Machine in working position.

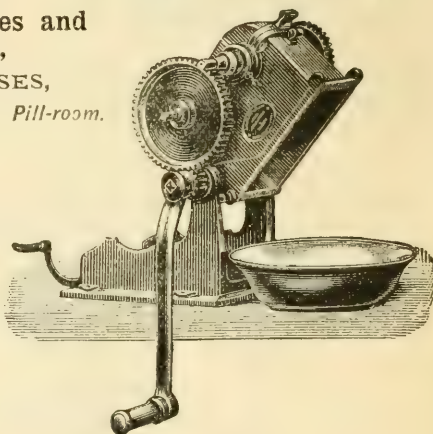


FIG. 131.
Machine tilted for discharge.

Prices and full particulars on application to
WERNER & PFLEIDERER,
86, Upper Ground Street, London, S.E.

BY ROYAL LETTERS PATENT, No. 16,713.—
DECEMBER 20th, 1886.

GODFREY'S CHLORIDE OF AMMONIUM INHALER

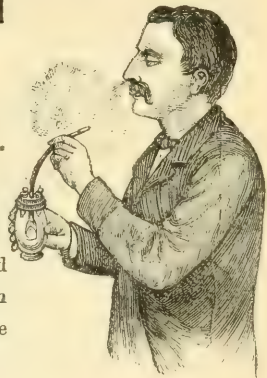
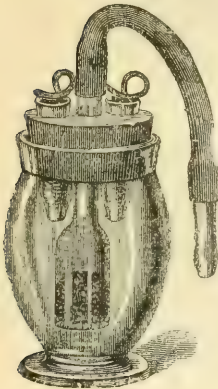
Catarrhal Throat and Ear Affections, Loss of
Voice, Bronchial Asthma, and Hay Fever.

THE SIMPLEST FORM
OF INHALER.

Very Portable.
Contains no Water.

SILVER MEDAL,
Brussels Exhibition, 1888.

Yields a plentiful cloud
of *Neutral Vapour*, with
little or no effort on the
part of the patient.



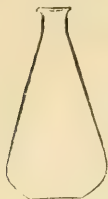
SHIPPERS AND LARGE BUYERS SUPPLIED ON LIBERAL TERMS.

PRICE 7s. 6d. RETAIL.

May be obtained through S. MAW, SON & THOMPSON, London.

*Illustrated Prospectus, with the "History of Chloride of Ammonium as a
Remedial Agent," free by post.*

Sole Makers—GODFREY & COOKE,
30, Conduit Street, Bond Street, LONDON, W.



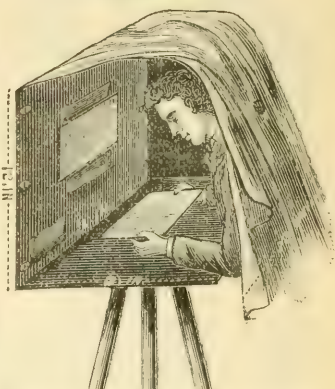
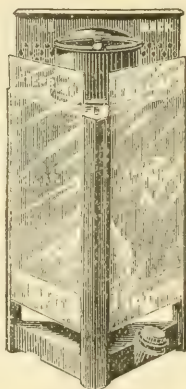
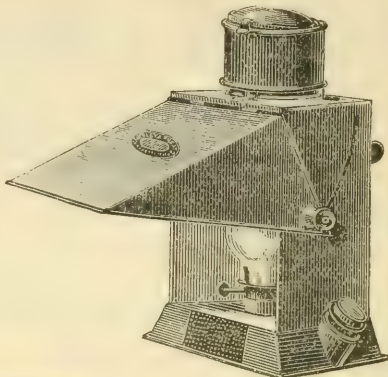
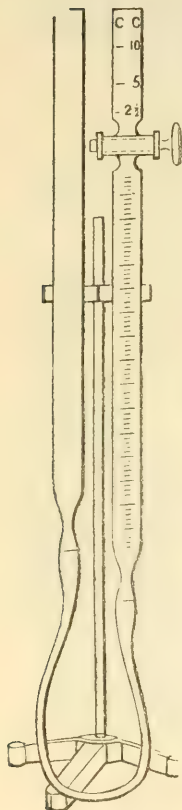
SOLE MAKER of the Registered PATTERN FLASK. Combines the globular and conical shape, without their respective disadvantages. Prices, 2 oz. to 64 oz., 3d. to 1s. 2d. each.

ALLEN'S NITROMETER. The official process in British Pharmacopœia. With stand complete, 12s. 6d.

SNELL'S ELECTRO-MAGNET, for the extraction of particles of metal from the eye, etc.

ARNOLD'S SULPHUR APPARATUS. The simple and ready method for estimating "S" in metals. Price complete, 84s.

THE LECTURER'S "PERFECTION" READING LAMP. 10s. 6d.



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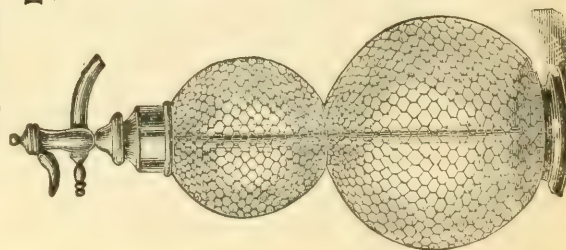
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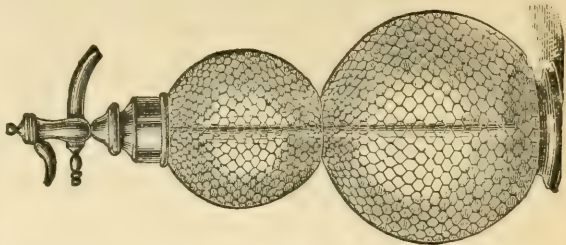
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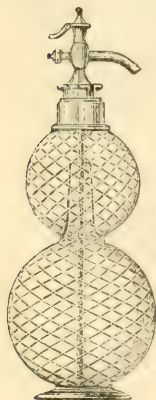
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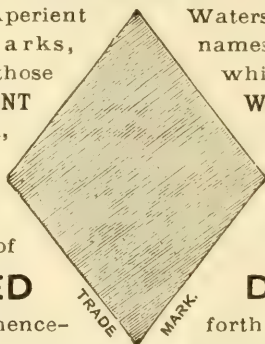
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